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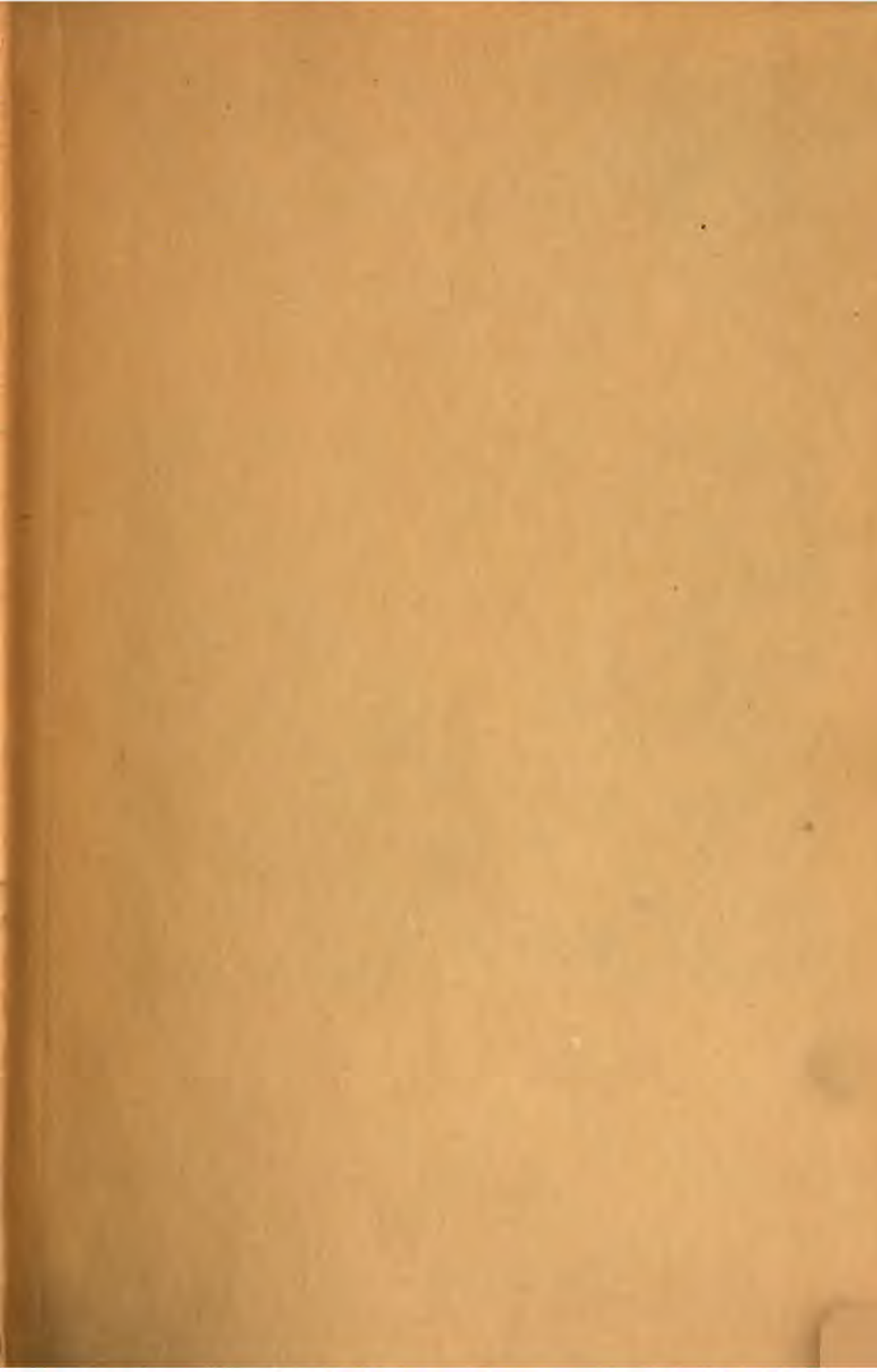


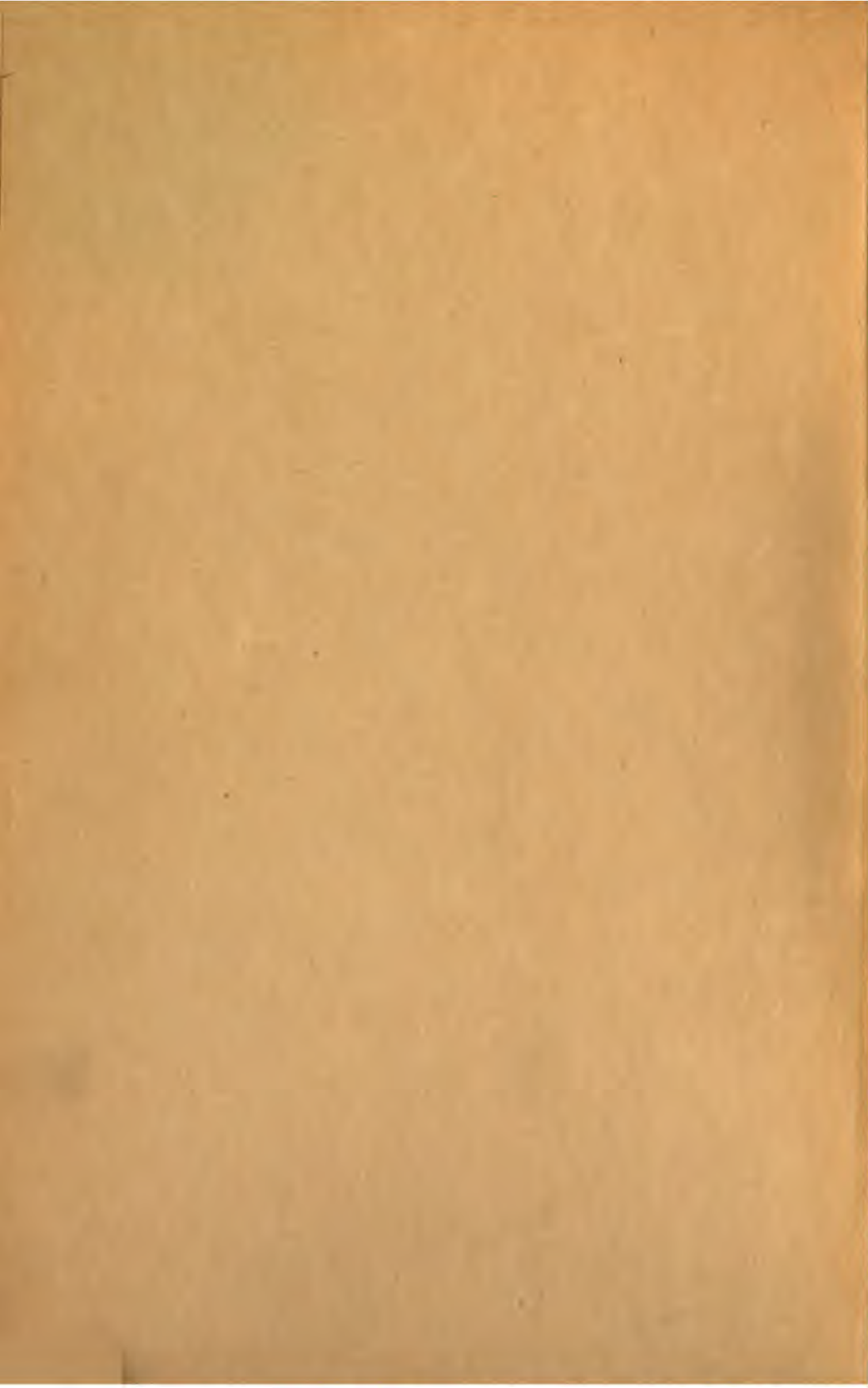
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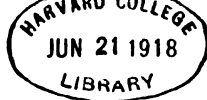
HORTICULTURAL SECTION



TREES, SHRUBS AND PLANTS FOR FARM
AND HOME PLANTING

BY
C. P. HALLIGAN

EAST LANSING, MICHIGAN
1918



The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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Grayling, Crawford County, 80 acres deeded.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.

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TREES SHRUBS AND PLANTS FOR FARM AND HOME PLANTING

BY C. P. Halligan

INTRODUCTION

Why One Should Plant.

(a) Because of a desire to make the farm home a better place in which to live.

The rural ideal today of making the country a better place in which to live begins with the improvement of the interior conveniences of the house and the exterior surroundings of the home. The attachments that are formed for the home are frequently associated with the trees, shrubs and flowers that surround it. A farm house standing out in its nakedness to the severest storms of winter and the torrid heat of summer with no trees to shelter it or shrubs to clothe it, is hardly conducive to the formation of loving thoughts and tender memories. From such farms the young folks migrate to the cities and the old folks to the towns. If the farm is worth farming, then the grounds about the house are worth developing into a pleasing home grounds.

(b) Because it is one's duty to plant.

Every man owes it to his family, his neighbors and his community to develop his property and maintain it in as neat and attractive a manner as his means will permit.

The environment of children to a large degree measures their ideals. Noble characters and lofty ideals are not formed amid unclean and unkempt surroundings. Healthy children with wholesome thoughts demand an environment that is healthful, clean and inspiring.

The value of property for living purposes depends considerably upon the general appearance of the surrounding property. It no longer remains a personal privilege for one to neglect the appearance of his grounds as such neglect detracts from the value of the property of his neighbors as well as from his own.

A community that is characterized by pleasing homes that are neat and trim in appearance constitutes an inviting location for desirable people seeking new farm sites. The value of such farm properties is measured upon this factor as well as upon the general productive value of the land. It is a public duty, therefore, of all who are fortunate enough to possess a bit of land surrounding the house, to make the place as pleasing, interesting and livable as a home grounds should be that its attractiveness may enhance the beauty of the street and community of which it is a part.

(c) Because it is a good financial investment.

A few dollars and a little labor spent in developing and improving the home grounds, in properly planting a few trees and in arranging shrubs around the grounds, will, in a few years, often increase the financial value of the property more than a similar amount spent in any other manner.



A log cabin; the farm home of the pioneer, typical of the first stages in the agricultural development of Michigan

In fact, the value of a stately huge elm, majestically overspreading the house and lawn, can hardly be reckoned in dollars. Such well developed trees and plantings that have been judiciously placed are simply the basis of all that is desirable about them.

If farmers would invest more of the profits of the farm in improvements on the place, rather than in outside investments that they know less about, making the farm home annually a better place in which to live, many of them would be far more comfortable today both financially and physically.

Invest at least a part of the profits of the farm each year in making the place a more pleasing and comfortable one in which to live and one will feel less disposed to give it up and retire to the town. Make the farm grounds themselves worth retiring upon. Make this, a well improved farm, the heritage of your children and more of the younger generation will not only stay on the farm but a farm for them worth remaining on will be the result.

SELECTION OF BUILDING SITES

In the selection of a site for any building, there are three determinant requisites. The first of these requisites is *soil drainage*. A poorly drained site for a building is unhealthful, disagreeable and frequently a very costly site to maintain. A well soil-drained site is of first importance.

Air drainage is of equal importance. A damp or stagnant air is as objectionable to the health as poor soil drainage. The site for buildings, therefore, should be such as to possess a good natural circulation of air. Beware of hollows or pockets on hill sides where the cold damp atmosphere



The farm home as desired today, made pleasing by good architecture and proper landscape plantings

collects and has no channels through which it may drain away. Generally, where we find good soil drainage, we also find it well air drained but there are many exceptions to this rule.

The third requisite is *sunshine*. Sunshine makes a dwelling bright, cheerful and attractive as well as exercising a great beneficial influence in maintaining its healthfulness. Direct exposure to sunlight kills most germs. Germs thrive best in a dark, moist atmosphere. A dwelling or barn then, with plenty of windows exposed to the direct rays of the sun, is a great help in maintaining pleasant and healthful surroundings.

That a site for a building should possess these three requisites, namely, soil drainage, air drainage and sunlight is of first importance.

Selecting the House Site. The future value and pleasantness of the farm home will depend also upon a proper consideration of the aesthetic qualities of the site for the house.

The house should be situated *some little distance back from the main road*. It is a common error to find the average farm house entirely too near the public road to give that privacy and air of dignity and refinement which may be obtained by a proper treatment of a farm grounds, possessing an ample front lawn. Today, with the increased traffic on the country



Before Planting. Is planting worth while? A house with no trees to shelter it or shrubs to clothe it. See the following picture.

roads, the dust nuisance becomes a very serious problem, the principal solution of which consists in keeping the house well back from the road and sometimes planting heavily along the roadside.

In selecting the site for the house, advantage should be taken of any vistas that are especially pleasing. If the house is placed so as to obtain a beautiful view over a lake, along a river or across a valley, it will enhance the value of the property without increasing its cost. Today, with the ever increasing demand for country homes, these vistas prove very desirable assets.

It is well also, in selecting a site, to consider the *exposure*. A site that is more or less protected from the north and west with an open exposure to the south and east, is ideal. On many farms, a site sheltered by a woods, hill or other natural condition, may be found which would prove a great protection during the winter months. Whether or not these conditions are available, there is always room enough on the farm to place the buildings in such a way as to receive the greatest amount of sunlight, especially during the winter. Whereas it seems to be the prevalent opinion that a building should run directly north and south or east and west, it is these problems of sunshine and exposure that should determine its direction.

Any topographical feature of the land might also largely determine the location of a building. The position of a group of large trees or a rugged boulder might prove the chief determinant.



After Planting. Same place as preceding picture but about three years later.
Was planting worth while?

A slight knoll generally makes an ideal site for a building. If the land is level and such a spot is not available, a building should be set rather high on its foundation and the soil from the excavation with a little additional filling, will tend to obtain at least a portion of these advantages. On farms that are hilly and rough, ideal sites may be found,—sites, too, that would prove of very little value for farming purposes.

THE PLANTING PLAN

In the development of the home grounds, there is need of a preconceived plan. This plan should be conceived in a general way when the building sites are being selected but the details may best be worked out after the buildings have been constructed and the drives and walks have been laid out. While the need for a plan is real and its existence essential, there is no necessity of carrying it out all at once. The execution of the plan may be gradual; the most important parts of it may be developed first and the remaining parts as circumstances permit. In fact, this gradual development is often desirable as the experience gained the first year or so often suggests desirable changes for future work. Under such conditions, a plan drawn to a definite scale, furnishing a definite record for future reference, is very essential as it insures the progressive development of the scheme that otherwise might be forgotten.

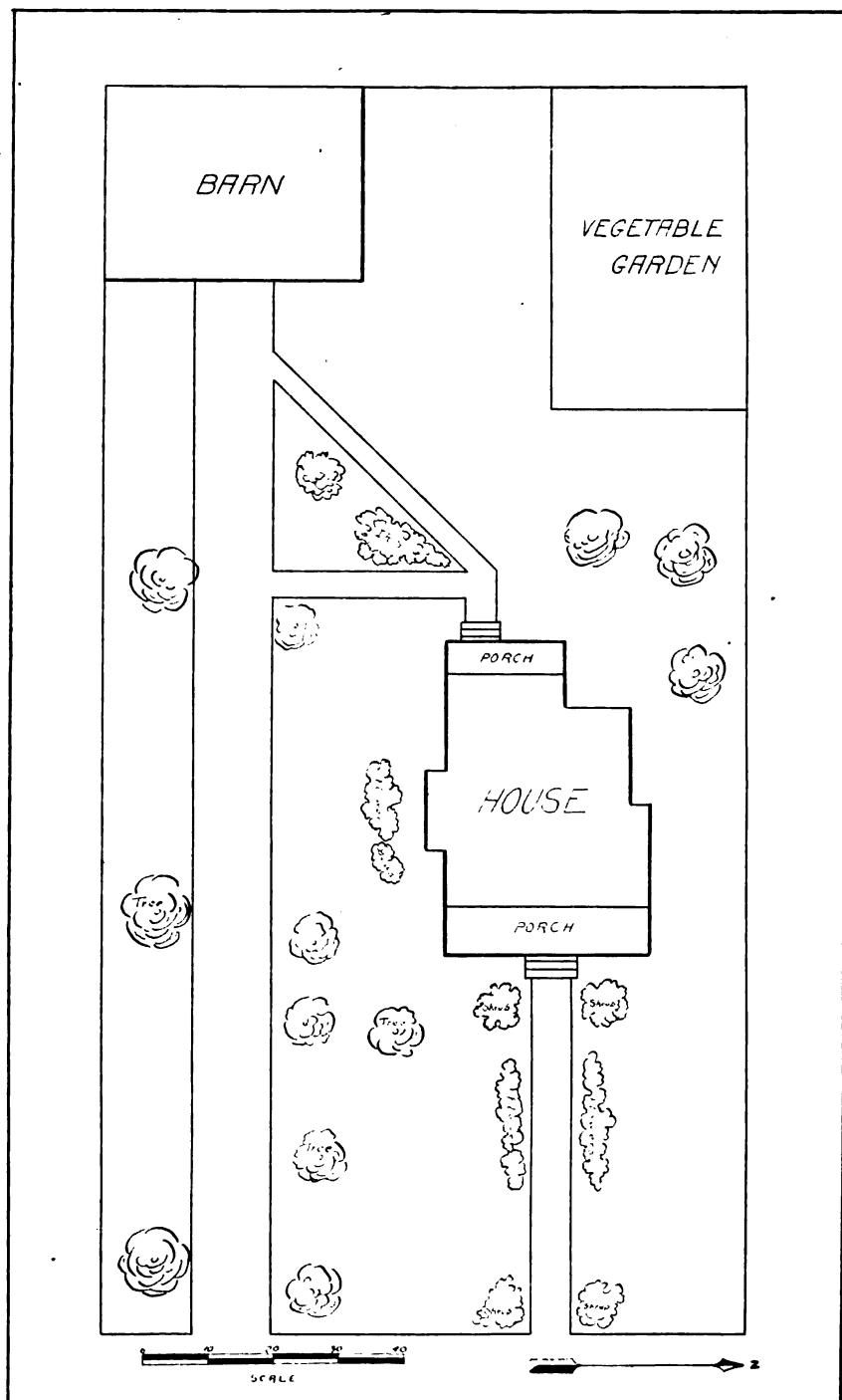


Masses of hardy shrubs about the foundation of the house tend to harmonize it with its site.

GENERAL DIVISIONS

An ideal landscape development of the home grounds involves a study of the general arrangement of the various divisions of the grounds to make them as serviceable and livable as possible. For example, there should be a service division for performing the necessary but often unsightly functions of a dwelling; a place for the ingress and storing of supplies and the egress of wastes; a lawn for the drying of clothes, a vegetable garden and places for any other such desirable purposes as the amount of available space will permit. This division should be designed to perform these functions most conveniently and to be maintained in a most tidy manner. It has been said that the typical American style of development about the home grounds consists in maintaining a "Queen Anne front and a Mary Ann back." This typical unsightly appearance of many back yards is largely due to an arrangement of the service division that does not conveniently and thoroughly serve these necessary functions.

The entrance division of the property usually includes the front lawn and entrance walks and generally is that portion of the property by which the public receives its impression of the entire place. The walks should be apparently direct and convenient while the appearance of the division, as a whole, should be trim and tidy, simple, dignified, hospitable and harmonious. Often there may well be other divisions, as a living division where the family may enjoy the privacy of family life out-of-doors without



An improperly planned home grounds showing the walks and drive ill-arranged and the plantings cluttering the lawns. (See Page 11)

being in full view of the neighbors and every passerby. A study of the general arrangement and coordination of these divisions is the first step in the development of the home grounds. It simply answers the question of what purposes the home grounds are to serve and what general arrangement of the grounds will serve such purposes in the most convenient and pleasing manner.

SOME DETAIL PROBLEMS

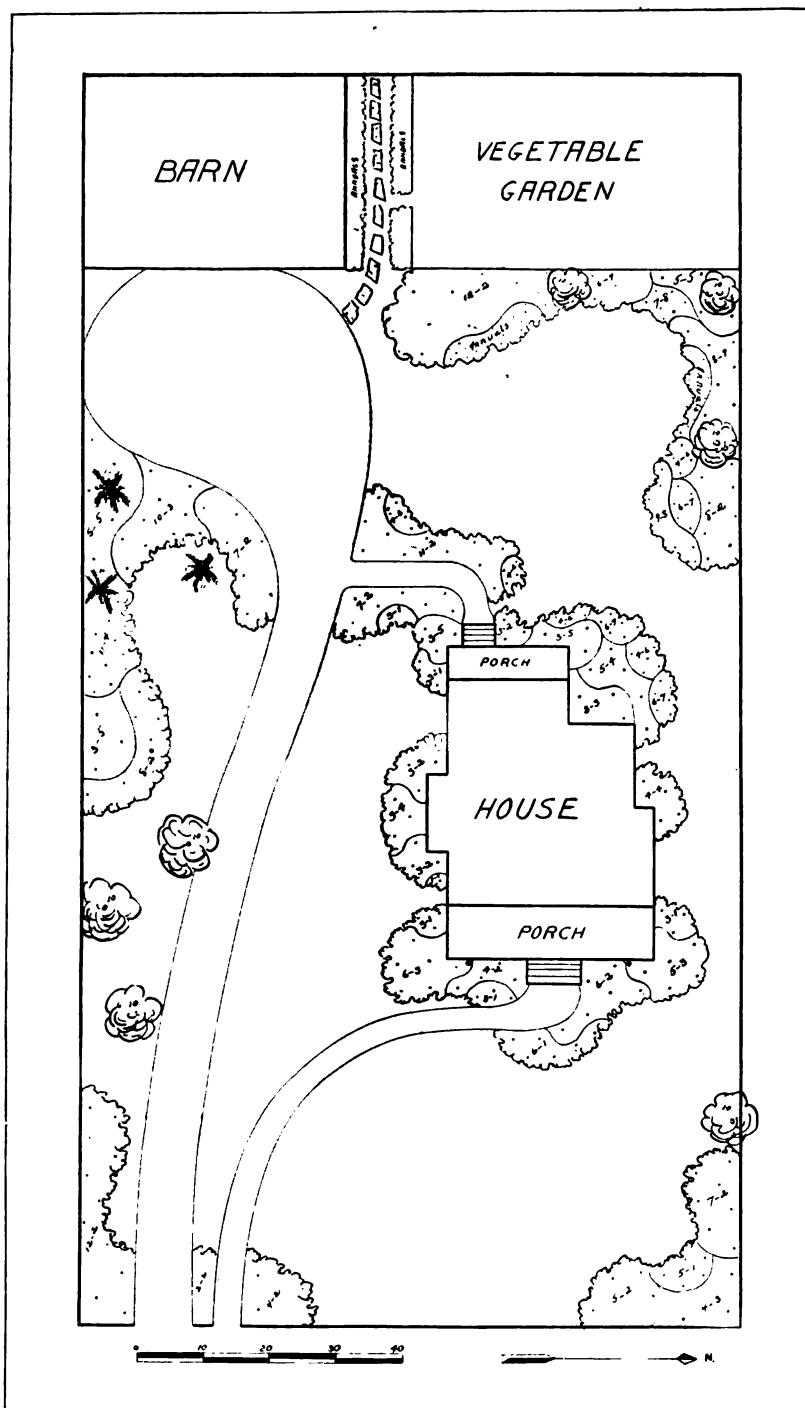
Grading. After this general arrangement of the grounds has been determined, the more detailed problems of improvement may be undertaken. Usually there is more or less grading that should be done and this work may prove very expensive without giving very gratifying results unless a careful study is made to adapt the new grades to the existing ones. Ideal grades should produce a proper setting for the house, making it appear somewhat higher than the surrounding property; provide surface drainage away from the buildings and for all portions of the lawn and smooth off all the small irregularities over the surface of the lawn. A building will possess an ideal setting as far as grades are concerned when it appears to be located on the summit of a slight knoll with the land

Explanation of Planting Plan on Page Eleven

This design shows a desirable location for a house and barn on a small suburban lot in reference to the exposure and distances from the sides and front of the lot. The drive is so designed and planted as to screen the view of the barn and its service yard from the road. The plantings consist largely of masses of hardy shrubs disposed around the foundation of the house, the boundaries and corners of the lot, leaving an unbroken lawn in front and a well screened and protected back lawn. A few trees are so disposed as to frame the view of the house from the road, to aid in screening the barn and to produce some shade over the back lawn. Hardy perennials and annuals are massed in the foreground of the shrubbery plantings about the back lawn and along the stepping-stone walk leading to the garden and back of the lot.

The first number in the mass plantings indicates the number of plants to be used, the dots showing the location of each, while the number after the dash is the index number of the kind to be used.

Index number	Common name of plant	Latin name
I	Japanese Barberry	Berberis Thunbergii
II	Bridal Wreath Spirea	Spiraea Vanhouttei
III	Tartarian Honeysuckle	Lonicera Tartarica var. grand. rosea
IV	Japanese Rose	Rosa Rugosa
V	Lilac	Syringa (In Variety)
VI	Paeony	Paeonia (In Variety)
VII	German Iris	Iris Germanica (In Variety)
VIII	Hardy Phlox	Phlox decussata (In Variety)
IX	Lemoines Deutzia	Deutzia Lemoinei
X	Deciduous Tree	
XI	Evergreen	
o	Vine	



A properly planned home grounds,



A typically ill-arranged home grounds. The front lawn cluttered by meaningless plantings. A good opportunity wasted.

sloping gradually away from it on all sides. On small lawns, the grades may be straight but as the extent of the lawn increases, they should assume the more graceful effect of a slightly rolling or waving surface. The use of terraces should usually be avoided as they are expensive to construct and to maintain and are conducive to a very formal effect.



A properly arranged home grounds. A simple, harmoniously designed farm house, situated well back from the road on a slight knoll, with a wide, unbroken front lawn framed along the back and boundaries with trees.

WALKS

Walks. On the small place, the designing and laying out of the walks and drive is a simple problem. They should be as direct and as convenient as conditions will permit; but on the larger place where the house is situated some distance back from the road, their design is often a more perplexing problem. Besides being convenient and direct, they should be graceful and pleasing in their lines, making them harmonious with the natural landscape effect of the grounds. Frequently, they may enter the property near the front corners and in simple sweeping curves approach the building, leaving a broad unbroken front lawn effect. Such an effect adds to the apparent extent of the grounds and produces an ideal setting for the buildings and plantings. It is desirable, therefore, in arranging the walks and drives to keep them well to the sides and boundaries whenever conditions permit.

LAWNS

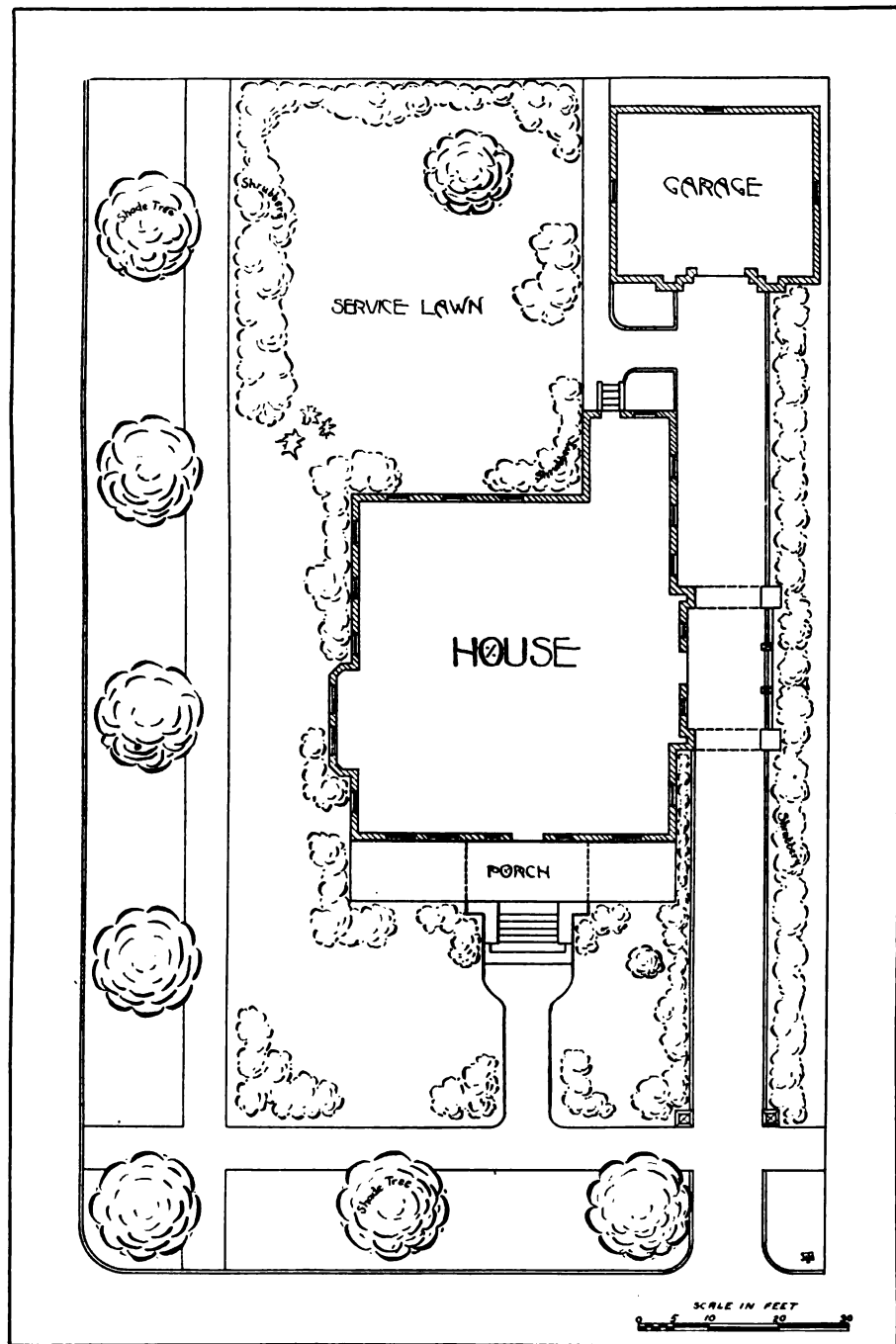
A good lawn is the most important feature of a well developed home grounds. It is often referred to as the canvass upon which the picture is painted. It should possess openness and extent and be framed with plantings of trees and shrubs about its borders. Never should it be cluttered with meaningless plantings of individual shrubs and trees as is most commonly done. Being such an essential and permanent source of beauty, its construction and maintenance deserves the most careful consideration.

Construction. The soil for a lawn should be of good texture containing plenty of plant food and enough humus to retain moisture. A strong clay loam or a sandy loam with a clay subsoil most nearly approaches these conditions. When a lawn is to be constructed upon light sandy soil, a top dressing of about two inches of clay with a heavy application of well rotted manure should be mixed with the first three or four inches of sand. Frequently, in building a house, the soil excavated from the cellar is spread about covering the good top soil with a poor sub-soil. This sub-soil is of poor texture, contains little available plant food and is an extremely poor soil for lawns. Where it is necessary to use this sub-soil for filling, the top soil should be first removed to be later replaced on the surface.

In the *grading* of a lawn, first endeavor to obtain good surface drainage; see that there is a slight slope away from the buildings; that there are no low pockets where water may stand during the winter and spring, and that the area as a whole, is either naturally or artificially well drained.

Except in some very special cases, a level lawn should not be constructed. It lacks naturalness and decreases the apparent extent of the lawn. In grading, endeavor to preserve the slight natural slopes and curves of the land, remembering that nature never produces perfectly level surfaces. This part of the grading should be carefully studied and considered before starting the work. The way in which it is done will determine whether a graceful, pleasing, natural lawn is secured or a stiff, restrained, unsatisfactory one is the result.

After the general slopes have been established, the land may be harrowed if necessary and any small uneven places smoothed off.



A simple planting design of a small corner lot, showing the arrangement of the plantings, drive and garage with the service lawn screened by plantings from the road.

If the land has been allowed to remain over winter in a rough condition, the soil will have become well settled by spring and will be ready for the final work before seeding. Pick off all the stones which have come to the surface during the winter and then go over the land with a shallow harrowing or raking. If it can then be rolled, the small uneven spots will become very apparent and they can then be leveled off with a hand rake. By re-rolling and re-raking the land in this way, the surface can be made as smooth and even as desired.

Fertilizers. Well decomposed stable manure is the best general purpose fertilizer for lawns. It contains all the chemical elements essential for plant growth and adds humus to the soil, thus making it more retentive of moisture and also improving its texture. If this can be used, a heavy dressing should be applied. A ton to two thousand square feet would not be too heavy.

Chemical fertilizers may be used to advantage after the grass is well started but should never be applied at the seeding time as they may kill the young roots which come in contact with them during germination. It must be remembered also, in using commercial fertilizers that they never improve the physical condition of the soil. There is no humus added to the soil by their use and hence the soil texture is not improved. It is simply an addition of the essential food elements and should always be regarded as such. They are easily applied, contain no weed seeds and may be readily obtained.

Some of the most desirable forms of chemical fertilizers for lawns are fine ground bone, wood ashes, and the high grade forms of complete fertilizers. Ground bone is a very good form of fertilizer for lawns and although it contains principally phosphoric acid, it furnishes some nitrogen and lime. Unleached hardwood ashes are used as a source of potash and if applied each spring soon after growth begins, will generally prove very beneficial. Complete high grade fertilizers for lawns may be obtained from almost any fertilizer dealer and, while more expensive than the other forms, they are often quite efficient in maintaining the lawn.

Although the amount of fertilizer advisable to apply will depend much upon the condition of the soil as well as upon the form and strength of the fertilizer to be used, a dressing of about 2.5 pounds per hundred square feet would be a moderate application under average conditions.

Varieties of Grass for Lawns. The best variety of grass for lawns, under general conditions in Michigan, is Kentucky Bluegrass (*Poa pratensis*). While it is rather slow in starting, it produces a permanent lawn of fine texture and of a rich green color. The crown of the plant sets very close to the ground thus permitting close clipping and the plant, after becoming established, spreads rapidly by underground roots.

Although a permanent bluegrass lawn may be desired, it is often advisable to sow other varieties with the bluegrass seed. Of the rapid growing grasses that may be used for this purpose, the English rye grass (*Lolium perenne* var. *tenue*) is one of the best. It is an annual grass and a little coarse in leaf, but starts rapidly, produces a very early effect and covers the ground which might otherwise be occupied by weeds. Do not use oats, rye or timothy for this purpose.



A row of cottages before planting. Note how bare and bleak they appear. See the picture on the following page.

Redtop (*Agrostis alba*) is a thick growing grass which produces a good lawn effect the first season. It is of a finer texture than rye grass but does not grow quite as rapidly on the start. It grows better under adverse soil and moisture conditions than most other grasses.

White clover (*Trifolium alba*) is frequently used on lawns as many people desire the appearance of the white clover blossoms in the summer. Others object to its tendency of giving the lawn a spotted effect.

On a very sandy soil the Rhode Island Bent grass (*Agrostis conina*) does well, while in very shady places the Woodland Meadow grass (*Poa nemoralis*) may be used. Where the lawn is on high, dry situations or slopes the Sheeps Fescue (*Festuca ovina*) will be found desirable, while on low wet places the Various-leaved fescue (*Festuca heterophylla*) will thrive.

For the average lawn, a good mixture is one-fourth Fancy Red Top, one-fourth English Rye grass and one-half Kentucky blue grass. If the area to be sown is small and the conditions of soil or exposure somewhat variable, it is advisable to buy a high grade prepared lawn mixture from a reliable seedsman. This mixture will generally contain seed adapted to various conditions and will prove more convenient and frequently better than the homemade mixture on such a small scale.

Frequently grass seed contains a great many weed seeds, often of a kind that may prove a serious nuisance and expense to get out of the lawn if they once become established. It is best to buy only the best seeds from the most reliable seedsmen. If a large quantity is to be procured, it would be advisable to send a sample to the Division of Botany of the State Experiment Station where it will be examined for purity free of charge.



The same cottages as in previous picture three years after planting. The simpler the architectural features the greater is the importance of plantings.

Sowing the Seed. In starting a lawn use plenty of seed, one and one fourth pounds to about 1000 square feet or fifty pounds to the acre (43560 sq. ft.) being none too much. Thick seeding chokes out weeds and assists in producing a quick effect.

Select a day when there is no wind to sow the seed. Early in the morning or about sun down is a very good time, and if just before a rain, so much the better.

By sowing the seed in the following way, an even stand is quite assured: taking one half of the amount of the seed to be sown and beginning at one end of the lawn, sow in parallel strips until the entire lawn is covered; then take the remaining one half of the seed and sow in strips in the other direction. If this is properly done, there should be no streaks or vacant spots in the future lawn.

After sowing the seed, unless directly followed by rain, the soil should be rolled. Raking or harrowing after sowing is apt to bury the seed unevenly.

Maintenance. After the grass has grown to a height of from four to six inches, it should be given the first clipping, being careful not to cut very close. A scythe is better for this cutting than a lawn mower as it will not pull out the young plants or cut as close as the mower. The future cuttings should be performed frequently enough to permit the clippings to remain on the lawn without being unsightly. These clippings if allowed to remain, will form a dense mulch around the base of the plants and protect the soil from drying out during the summer months. Cut frequently then but not too close.

Additional seed should be applied to all lawns at least every spring and often another sowing would prove beneficial the latter part of June or in September.

The most effective method of controlling weeds in lawns is by securing good drainage to the soil, keeping the lawn well supplied with plant food and the soil well filled with pure seed. Make the conditions for plant growth most favorable and there will be little chance for weeds to gain a foothold and develop.

PLANTING

Very ordinary looking buildings can be made attractive and homelike if the planting is properly done. It may be said that the less prominent the architectural features of a place, the greater the relative importance of the plantings. Hence it is very important that considerable attention be given to the planting of the ordinary farm house.

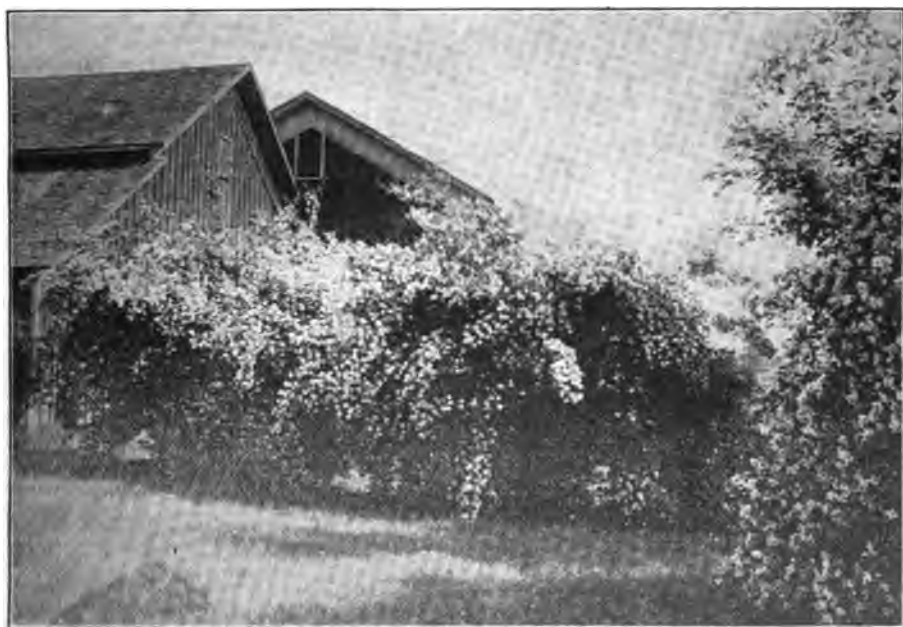
Functions of Planting. Before any successful attempt may be made in this line, one must first inquire as to the functions or purposes of the plantings to be made. In planting farm grounds, let it be realized that it is the endeavor to create a picture. That in this picture there are given as its elements, a farm house and other buildings,—roads, walks, lawns and other more or less separated elements. To unite these several disconnected parts into the production of one harmonious composition is the leading function of the plantings. To arrange the plantings about



Farm buildings may be made to harmonize with the home grounds by appropriate planting,

the house that the building may seem a natural outgrowth of the spot; to so arrange the plantings on the grounds that each and every planting may seem dependent upon the presence of every other planting or other element in the design, is the purpose of the planting. When it can be realized that these plantings are made not primarily for the sake of their own individual beauty but more because of their relationship to the design as a whole, to the picture about to be created, the first principle to guide one in planting has been mastered.

The planting of each and every grounds is a new problem, differing in certain respects from every other one. There are no definite rules then that can be given to guide one in the work; no ideal plan which may be drawn to serve all places; but there are a few general principles which may be suggested as a guide when solving many of these problems. Before any planting design is made, the grounds should be studied in reference to the general arrangement that is most serviceable. The style of architecture of the house, the position and character of any large trees already on the grounds, the slope and general character of the land, and any other natural condition should be studied to "see what kinds of beauty,

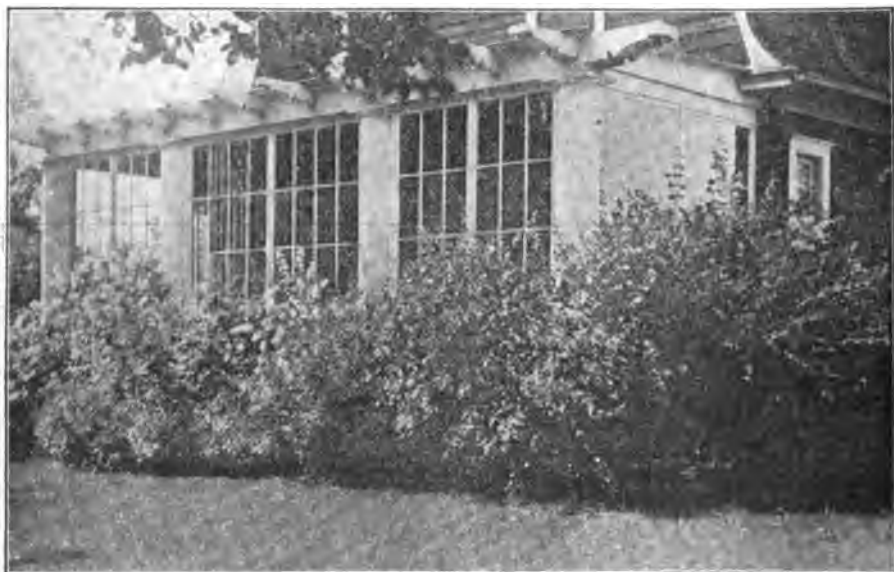


Plantings used to screen an unsightly view of neighboring barns.

what general character of pleasing appearance these conditions most readily suggest." Each and every home grounds is more or less suggestive of a certain type of beauty which may be brought forth and emphasized with the least difficulty.

After perceiving this type of beauty, one must then proceed to make the necessary details of arrangement, emphasize and enhance the character thus selected. One will first find certain elements which detract from the beauty of the grounds, which are defects in the picture, and should be screened by the use of plantings. Views within the grounds, such as of the henhouse, barnyard, a boundary fence or service drive and other unsightly spots; views beyond the grounds, as of a neighbor's shed, the back of a neighbor's barn and other views hardly pleasing and accept-

able to the sight,—all these should be entirely hidden from view by the use of plantings, or at least partially broken up to minimize their unsightliness.



A mass planting of hardy shrubs about the base of the porch tends to harmonize it with the lawn.

There are other elements in the design which should be just as carefully preserved and enhanced by plantings. The most pleasing lines and portions of the house, for example, may be emphasized and carefully preserved to the view. A wide sweep of open lawn, with a border and background of trees and shrubbery, is always a pleasing and acceptable sight. Vistas without the grounds, as of a distant woods, a winding river or a neighboring farm house and even the travel upon a public road, are often welcome sights which add to the pleasure and value of the grounds. It is especially important that these vistas be carefully preserved from the living rooms of the house, not always from the parlor but from those rooms where the family spend the major portion of their time. The plantings then serve a very important function by concealing the defects in these places and by enhancing those parts that are most pleasing. Thus, it may be seen how beautiful and attractive some of the ordinary looking farms of today may become by the proper use of plantings. How much more important this landscape use of plantings becomes on a common, ordinary looking farm where there are generally so many unpleasant sights which detract from the looks and very often from the value of the farm.

Plantings, when improperly used, may detract from the value and looks of the farm as well. The effect of a well-designed farm house is very frequently ruined by poor plantings. Trees planted too thickly



Mass plantings of trees and shrubs should be disposed about the boundaries of the lawn.

or too closely in front of the house; a lack of harmony in the design of the grounds to that of the house; plantings so placed as to hide the house from its most pleasing point of view—these are a few of the many causes which often spoil the effect of a well designed house by improper plantings. Let it be remembered then that plantings are to enhance rather than to detract from the expression already given by the design of the house and to harmonize it with its site.

There are three general rules of guidance in arranging the plantings:

First,—avoid straight lines in planting. The general effect of all lines in planting should be graceful and naturalistic rather than stiff, formal or artificial. Plantings should seem to be a natural outgrowth of the spot rather than a crude piece of man's handiwork.

Second,—arrange the plants in groups and masses, selecting few kinds and many of each rather than many kinds and few of each.

Avoid planting meaningless, isolated specimens over the lawn. Naturalistic masses and groups of plants are necessary to give structural character to the design and each group or mass should consist of many specimens



Plantings properly arranged to enhance the architecture of the house

of but a few kinds, rather than one or two specimens of several kinds. The kinds of shrubs selected should be repeated in the various groups and masses not precisely in the same combinations but sufficiently so that the effect of one planting may be harmonious with the others. In this manner unity of effect may be obtained.



Plantings should be massed about the base of the buildings, using many specimens of but few kinds rather than one or two specimens of several kinds.
Bridal wreath spirea, (*Spiraea Vanhouttei*.)

Third.—plantings should be massed about the base of the buildings, grouped about the junctions or curves in the walks, massed about the boundaries and corners of the property but not usually along the front boundary of the property.

When arranged in this way, an open lawn bounded with naturalistic plantings of shrubbery and trees will be the general effect.

In arranging these plantings, they may perform other desirable functions also. They may be arranged to shelter the house from the winter storms and the summer heat, or to frame desirable vistas and thus accentuate their attractiveness. Masses of shrubs may be used to take the place of an undesirable fence or hedge. They may be planted to prevent people from wearing paths across the lawns and to unify the walks, buildings and other elements of the grounds into one harmonious design.



Shrubs planted in the corners of the entrance porch generally prove effective.

How to Plant. The planting should be done early enough in the spring so that the shrubs will be well established before the heat and drought of summer overtakes them. In preparing the beds, they should be dug to a depth of a foot or more and well manured. The distance of setting them depends largely upon the size of their growth. Japanese barberries should be planted two feet apart, spireas three and one-half feet and lilacs about four to five feet.

In three years, when set at these distances, the branches should be so intermingled that their individuality in the beds is lost and a unified mass effect produced. In transplanting, keep the roots moist and prevent them from being exposed to the sun and wind any longer than necessary. Set the plants slightly deeper than they stood in the nursery and pack the best fine soil firmly about the outspread roots. If the soil is dry, water after planting. It will help to compact the soil about the roots and keep them moist. The tops may then be pruned back to balance the loss of roots, leaving a few large buds on each of the strongest shoots.

WHAT VARIETIES TO SELECT

Shrubs

The choice of varieties is perplexing because there are so many handsome shrubs all of which seem most desirable to the home garden maker. A few of the good old standbys that are handled by every nurseryman and sold by the millions, that are sure to give one his money's worth and are safest for the beginner to tie to are given in the following list.

Spireas. First of all there is the bridal wreath spirea, *Spiraea Vanhouttei*, the most popular spring flowering shrub. Its remarkable freedom

of bloom and beautiful foliage produced on branches drooping gracefully to the ground makes it exceedingly attractive. This spirea, which is only one of a large group of Spireas, is very hardy and grows well upon any

moderately rich and well drained soil. It attains a height of about five feet and is particularly adapted for mass plantings about buildings and porches, along walks and drives or around the boundaries of the lawn. Of the other spireas, there is the double-flowered spirea that one sees everywhere named *Spiraea prunifolia* because its leaves resemble those of the *Prunus* or plum. *Spiraea arguta*, altho not as well known, is a most desirable early spring flowering shrub with small delicate foliage and white flowers. It is particularly adapted for planting in the foreground of other higher and coarser growing shrubs. For summer flowering, the species is represented by *Spiraea*

Bumalda var. Anthony Waterer



Shrubs massed about the base of trees relieve the bareness of the trunks and tend to unify them with the surrounding lawn.

that blooms quite continuously from the middle of June until frosts overtakes it in the fall. Its flowers are produced in corymbs or flat flower heads of a rosy crimson color, sometimes approaching a magenta. Where a low shrub is wanted for summer effect, this is one of the best.

Thunberg's Barberry. It would be hard to name a shrub as cosmopolitan in its characteristics, combining as many desirable qualities as the Japanese barberry, *Berberis Thunbergii*. It is one of the few shrubs that is attractive at all seasons of the year. In the spring and summer its graceful branches are clothed with small yellowish green leaves that change to a bright scarlet in the fall. Later they are shed to expose the scarlet berries that enliven the landscape all winter. While a sandy loam soil seems to be ideal for the barberry, it will be found thriving equally well on practically all types of soils that are well drained and seems hardly more particular over exposure. The San Jose scale, plant lice and other pests seem to painstakingly avoid it. The graceful form it assumes and its low habit of growth make it suitable for filling in small spaces such as between walks or buildings or for planting in front of Spireas and other higher growing shrubs. There is nothing better to use where a low ornamental hedge is desired than this barberry that shifts for itself after it is once established.



Sorbaria sorbifolia generally known as the Ash-leaved Spirea, is desirable for planting steep banks.

Lilacs. The most common and still most indispensable of the shrubs is the lilac. There are so many desirable improved varieties of this old time flower that even if one were given a few bushes of the old-fashioned type by some kind meaning neighbor, one could not afford to plant them, the new improved ones are so much superior. They produce larger and better flowers over a longer season. Therefore, go to a nurseryman and get something that will be different and better than this old-fashioned type. There become acquainted with Marie Legraye, a beautiful white; Mad. Lemoine, the best double white; Dr. Regel, a handsome rosy pink; Chas. X, an attractive rosy purple; Toussant L'Ouverture, a very dark carmine colored in bud, turning to a violet-red when in full bloom and an endless list of other improved sorts of the old fashioned lilac, *Syringa vulgaris*. Then, there are other species of lilacs that include at least one other type that should be used. For landscape effects it is to be preferred to any of the former group because it seems to be more graceful in its growth with smaller leaves and large, open, gracefully drooping panicles of reddish-purple flowers. This is the Rouen Lilac listed in the catalogues as *Syringa rothomagensis*. The purple Persian lilac is very similar to it but more dwarf in its growth. For screens and backgrounds of shrubbery masses, used in separate colors rather than mixed, lilacs produce a most attractive effect in late spring.



Lilacs produce excellent effects when planted in masses on banks with a proper background of trees.

Mock Orange. The mock orange or syringa bush is another large, high growing shrub that is prized especially for its fragrant white blossoms that are so abundantly produced in June. The old-fashioned variety, *Philadelphus coronarius*, is the most fragrant but the newer varieties such as *Philadelphus coronarius grandiflorus*, produce flowers over twice the size and of a purer white. The yellow leaved sorts are not as vigorous or free flowering and should be used very sparingly. The green leaved sorts are very hardy and easily grown on any soil of moderate fertility.

Snowball. While the old-fashioned Snowball that was formerly planted in every yard is now considered of little value because its foliage is annually ruined by plant lice, its place has been taken by another bush called the Japanese Snowball, *Viburnum tomentosum plenum*. The flowers of this shrub are quite similar to the common Snowball but appear more attractive and of a purer white against the heavy dark green foliage of the bush. It delights in a rich moist soil and may be planted along the north side of buildings, a northeastern exposure being ideal. Although not entirely hardy in the northern districts, its superiority over the common snowball, both in foliage and flower, makes it a most desirable shrub. There are many other Viburnums also that are used by landscape gar-



The mock orange (*Philadelphica coronarius*) is one of the most cosmopolitan shrubs for home planting, being hardy, free from insects and diseases and easily grown.

deners that are more particularly adapted to the planting of parks and for producing other very naturalistic effects. Most of them are not as showy in flower but produce excellent summer effects by their fruits.

Bush Honeysuckle. The bush honeysuckles are very acceptable in plantings for the summer effect of their berries. While many produce beautiful spring flowering effects in white or pink, they are prized more for the red coral-like berries that color these plantings in midsummer after most of the shrubs are through blooming. *Lonicera Morrowii* is one of the best varieties for this purpose while *Lonicera tartarica* var. *grandiflora rosea* is one of the most effective in flower.

Weigela. A class of popular shrubs often confused with the honeysuckles, possibly because of their trumpet shaped flowers, is the *Weigela* or *Diervilla*. Although the latter is now considered the standard botanical name, in many of the catalogs, it is still listed as *Weigela*. Of the many varieties in pink, white or red that are now listed of this group, the old-fashioned pink flowering *Diervilla florida* continues to lead in popularity. There is another variety, *Diervilla hybrida* *Eva Rathke*, that is also used considerably by those familiar with its qualities. This variety is more of



Lemoine's Deutzia (*Deutzia Lemoinei*) is the hardiest of all the deutzias and excellent for planting in the foreground of shrubbery masses



Flowering shrubs, such as the large flowering mock orange, (*Philadelphus coronarius grandiflorus*) appear ideal with a background of trees.

a continual bloomer than the former, with deep carmine-red flowers and somewhat darker foliage. It seems to blossom almost as profusely in the shade as in full sunlight. It is found very acceptable, therefore, for planting along the north side of buildings or in other partly shaded situations.

Of the many other shrubs worthy of consideration, there are the golden bells or *Forsythias*, whose yellow blossoms are produced even before its leaves in the spring, so early in fact that the flowers are often caught by late freezes; also the yellow flowering currant, *Ribes aureum*, with its sweet fragrant blossoms, and the Japanese Rose, *Rosa rugosa*, with its luxuriant foliage and ever-blooming flowers. There is no trouble about having enough kinds to select from but the difficulty is in limiting the list to the ones that are best. For the home garden maker, it will be wise to stick largely to the old standard sorts.

SHRUBS FOR SPECIAL PURPOSES

Shrubs for Hedges

* <i>Berberis Thunbergii</i> <i>Thunberg's Barberry</i>	<i>Ligustrum amurense</i> <i>Amur Privet</i>
<i>Rosa rugosa</i> <i>Japanese Rose</i>	
<i>Spiræa Vanhouttei</i> <i>Van Houtt's Spirea</i> <i>or Bridal Wreath</i>	<i>Lonicera tartarica</i> <i>Tartarian Honeysuckle</i>
<i>Deutzia Lemoinei</i> <i>Lemoine's deutzia</i>	<i>Thuja occidentalis</i> <i>Arbor-Vitæ or White Cedar</i>

Shrubs for Border Planting

a. Low Growing.

<i>Deutzia gracilis</i> <i>Slender Deutzia</i>	<i>Spiræa Bumalda</i> var. Anthony Waterer <i>Anthony Waterer's Spirea</i>
<i>Berberis Thunbergii</i> <i>Thunberg's Barberry</i>	<i>Spiræa Thunbergii</i> <i>Thunberg's Spirea</i>
<i>Symphoricarpos orbiculatus</i> <i>Coral Berry or Indian Currant</i>	<i>Symphoricarpos albus</i> <i>Snow Berry</i>
<i>Kerria Japonica</i> <i>Globe Flower or Corchorus</i>	

b. Medium Growing.

<i>Ribes odoratum</i> <i>Yellow Flowering Currant</i>	<i>Rosa rugosa</i> <i>Japanese Rose</i>
<i>Spiræa Vanhouttei</i> <i>Van Houtt's Spirea</i> <i>or Bridal Wreath</i>	<i>Rhodotypos kerrioides</i> <i>White Kerria</i>
<i>Spiræa prunifolia</i> <i>Plum-leaved Spirea</i>	<i>Deutzia Lemoinei</i> <i>Lemoine's Deutzia</i>

c. Tall Growing.

<i>Diervilla florida</i> <i>Rose-colored Weigela</i>	<i>Philadelphus coronarius</i> <i>Mock Orange or Syringa</i>
<i>Lonicera Morrowii</i> <i>Bush Honeysuckle</i>	<i>Lonicera tartarica</i> <i>Tartarian Honeysuckle</i>
<i>Forsythia intermedia</i> <i>Golden Bell</i>	<i>Syringa (In Variety)</i> <i>Lilac</i>
<i>Viburnum (In Variety)</i>	<i>Euonymus americana</i> <i>Strawberry Bush</i>

Shrubs for Specimen Use

<i>Corinus americanus</i> <i>Smoke Tree</i>	<i>Euonymus alata</i> <i>Winged Burning Bush</i>
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*The plant names in this bulletin are those adopted by the American Joint Committee on Horticultural Nomenclature.

Chionanthus virginica <i>White Fringe</i>	Caragana arborescens <i>Siberian Pea Tree</i>
Exochorda racemosa <i>Pearl Bush</i>	Tamarix (<i>In Variety</i>) <i>Tamarick</i>
Prunus cerasifera Pissardii <i>Purple-leaved Plum</i>	Cercis canadensis <i>Red-bud</i>
Prunus communis <i>Flowering Almond</i>	Chaenomeles japonica <i>Japan Quince</i>

Shrubs for Exposed Lake Front

Rosa setigera <i>Michigan Prairie Rose</i>	Rhamnus cathartica <i>Buckthorn</i>
Viburnum opulus <i>High-Bush Cranberry</i>	Elæagnus argentea <i>Silver Thorn</i>
Tamarix (<i>In Variety</i>)	Rosa rugosa <i>Japanese Rose</i>
Rhus (<i>In Variety</i>) <i>Sumac</i>	Syringa vulgaris <i>Lilac</i>
	Philadelphus coronarius <i>Mock Orange</i>

Shrubs for Shady Situations

Symphoricarpos albus <i>Snow Berry</i>	Diervilla hybrida var. Eva Rathke <i>Weigela Eva Rathke</i>
Symphoricarpos orbiculatus <i>Coral Berry</i>	Viburnum (<i>In Variety</i>)
Calycanthus floridus <i>Sweet-scented Shrub</i>	Ligustrum amurense <i>Amur Privet</i>
Cornus (<i>In Variety</i>) <i>Dogwood</i>	

Shrubs for Sandy Soils

Rhus canadensis <i>Fragrant Sumac</i>	Rosa rugosa <i>Japanese Rose</i>
Caragana arborescens <i>Siberian Pea Tree</i>	Rosa setigera <i>Michigan Prairie Rose</i>
Forsythia intermedia <i>Golden Bell</i>	Berberis Thunbergii <i>Thunberg's Barberry</i>
Tamarix (<i>In Variety</i>) <i>Tamarisk</i>	Rhus glabra <i>Sumac</i>
	Cotinus coggygia <i>Purple Fringe</i>
Lonicera tartarica <i>Tartarian Bush Honeysuckle</i>	Spiræa Vanhouttei <i>Van Houtt's Spirea</i>

Shrubs for Steep Banks

- | | |
|----------------------------|------------------|
| Rosa setigera | Spiræa tomentosa |
| Michigan Prairie Rose | Hardhack |
| Rhus (<i>In Variety</i>) | |
| Sumac | |
| Sorbaria sorbifolia | |
| Ash-leaved Spirea | |

Roses

Hybrid Perpetuals

—For cut flowers.

(Half hardy, requiring some protection over winter)

- Frau Karl Druschki (*white*)
 Mrs. John Laing (*pink*)
 General Jacqueminot (*brilliant crimson*)
 Ulrich Brunner (*cherry red*)
 Paul Neyron (*deep rose*)
 Mrs. R. G. Sharman Crawford (*deep rose-pink*)
 John Hopper (*bright rose*)
 Marshall P. Wilder (*cherry carmine*)
 Prince Camille de Rohan (*deep crimson*)

Hardy Climbing Roses

- Baltimore Belle (*white tinted pink*)
 Crimson Rambler (*bright crimson*)
 Dorothy Perkins (*pink*)
 Lady Gay (*rose pink*)
 White Dorothy Perkins (*white*)

Roses for Landscape Effect

- Rosa rugosa (*Japan rose*)
 Rosa setigera (*Michigan Prairie rose*)
 Rosa rubiginosa (*Sweet briar*)
 Rosa rubrifolia (*Red-leaved rose*)

Hardy Bush Roses

- Austrian Yellow
 Persian Yellow
 Common Moss
 Blanche Moreau (*white*)
 Princess Adelaide (*pale rose*)
 Gracilis (*deep pink*)



TREES

*"Among all the materials at our disposal for the embellishment of country residences, none are at once so highly ornamental, so indispensable or so easily managed as trees or wood."**

Trees are especially valuable as screens, windbreaks, backgrounds for buildings, for shade and for their own individual beauty in a design. By a natural arrangement of trees in the improvement of the country home grounds, buildings which might otherwise seem bare and bald may be made interesting and often picturesque. They should be disposed around our houses in groups, masses, thickets and as single trees in such a manner as to rival the most beautiful scenery of nature as well as to provide all the comforts and conveniences of a rural home.

In selecting trees for home planting, the following requirements should be considered: namely—form, hardiness, adaptability, rapidity of growth, shade production,

freedom from insects and diseases, neatness and general beauty.

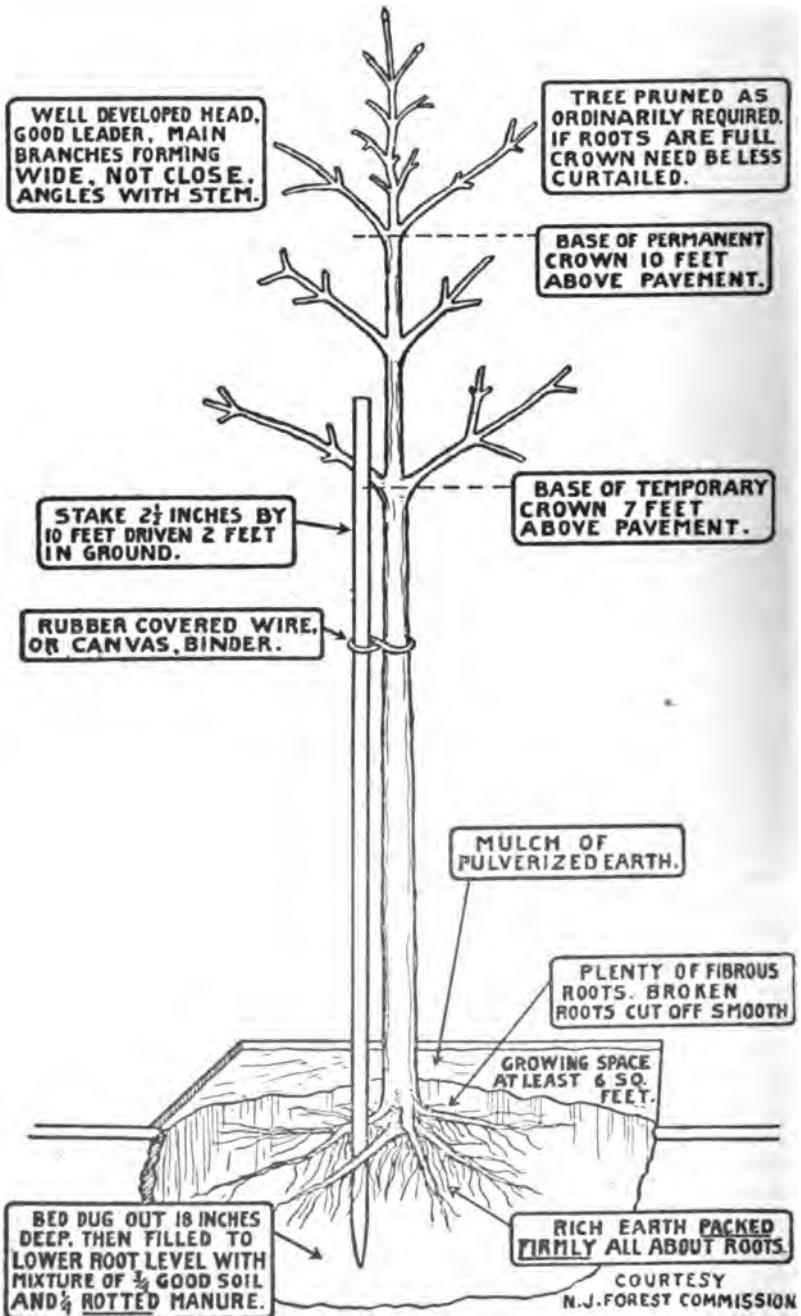
In purchasing trees one should obtain healthy, well shaped trees. It is generally a waste of time and money to set poor, deformed trees. Wild trees may be used but they are less likely to withstand the shock of transplanting than those that have been previously transplanted in the nursery. In purchasing shade trees, it is possible to set out trees as large as a foot in diameter but the cost is so great that few can afford to transplant trees of such size. As a rule, smaller trees transplant more successfully. Trees for street planting should be about two inches in diameter and ten to twelve feet in height.

In transplanting trees, as many roots as possible should be preserved as trees with large root systems do much better than those whose roots have been severely pruned.

As the tree is purchased from the nursery, the top or crown is usually already formed. This general shape of the top should be preserved in pruning after transplanting. If the root system has been severely pruned, it will be necessary, however, to cut back the branches of the top to maintain a balance between the roots and foliage, altho it is better to maintain this balance by saving the roots than by sacrificing branches.

*Section III, Chapter on "Wood," Treatise on the Theory and Practice of Landscape Gardening. By A. J. Downing. This book was the first landscape gardening book published in America and is considered one of the best at the present time. It started a great popular movement toward the development of beautiful home grounds and its author by his many writings and landscape gardening work exerted more influence in the development of American horticulture than probably any other single figure.

SHADE TREES.



HOW TO PLANT A TREE

During transplanting, the roots of the trees should never be allowed to become dry. If a choice is allowed, transplant a tree on a cloudy day as a bright sun or a dry wind exhausts the stored up moisture. As soon as the trees arrive from the nursery they should be "heeled-in" in moist soil until planting.



Large trees may be transplanted successfully during the dormant period by digging a trench around the roots, some three or four feet from the trunk to retain a large ball of soil with the roots.

In planting the tree, the hole should be dug slightly larger than is necessary to accommodate the roots without bending or twisting them. If the site, as is often the case, is on "made" ground, remove at least a cubic yard of the soil or rubbish and provide as much good loam. In planting the tree, spread a layer of fine mellow soil mixed well with about one-third its bulk of well decomposed stable manure, if available, in the bottom of the hole. Never use fresh manure. The tree should then be planted by packing the fine soil firmly about the roots, setting the tree about two inches deeper in the soil than it stood in the nursery. If the soil is dry at planting time, watering directly after planting will be beneficial as it will help much in packing the soil about the roots and supplying moisture.



After the ball of earth has been frozen, the tree may be transferred to its proper location.

DECIDUOUS TREES

Oaks

Of all the trees that may be used on the home grounds, the oaks are undoubtedly the best shade trees, for with few exceptions, they are beautiful, long lived and little subject to insects and diseases. They are commonly considered to be slow growing trees but when well cared for the growth of many of them is quite rapid. The *white oak* is probably the best known and one of the longest lived trees. While young, it has an elegant appearance and when old it generally becomes majestic and picturesque. It is especially adapted for lawn planting. The *red oak* seems to be satisfied with a comparatively poor soil, develops a straight sturdy trunk, a symmetrical top and its foliage turns a brilliant color in the fall. It is the most rapid growing of the oaks and well adapted for both lawn and street planting. The *scarlet oak* is much like the red oak, altho it is smaller in size and does well even on poorer soil. Its foliage becomes brilliantly colored in the fall and hence the name. The *pin oak* grows taller and more slender than most other oaks with an unusually straight trunk. The leaves are small and quite persistent through the winter. This tree thrives well upon moist ground but grows well even where the soil is quite dry. It is especially adapted for street planting and also makes a very desirable lawn tree, the foliage being less brilliantly colored than the red oak altho beautiful during all parts of the growing season.

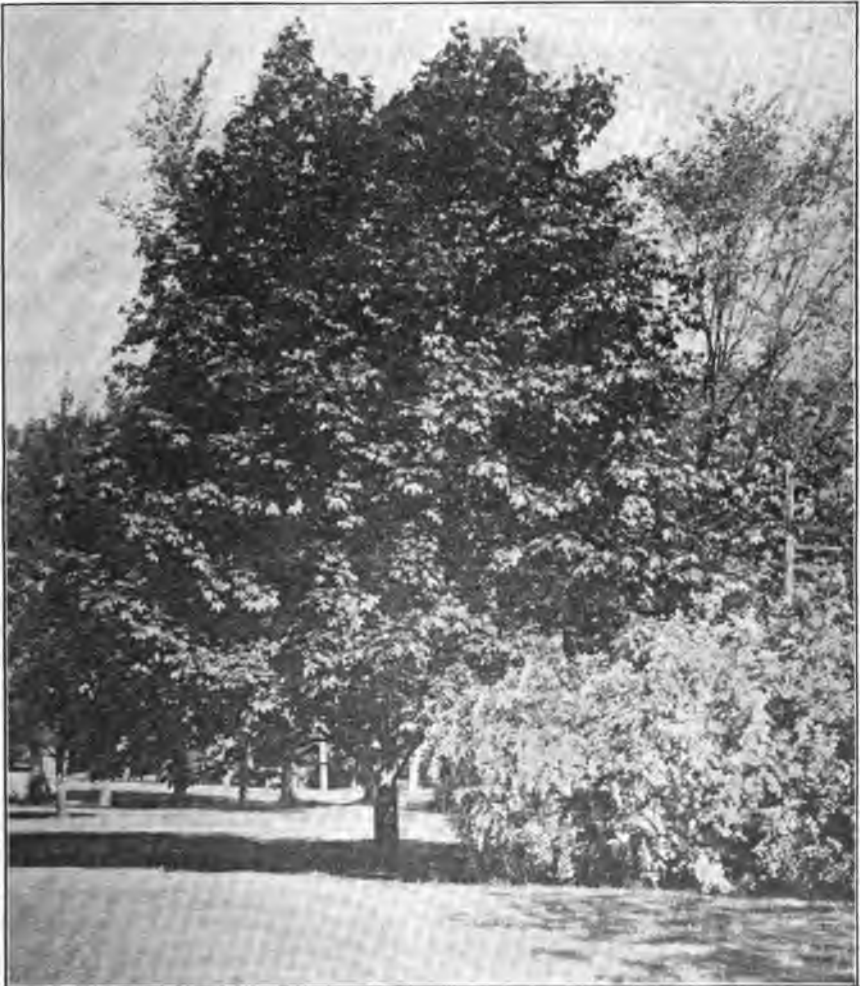
Elms

The American elm is probably the stateliest tree grown in this country. Usually the tree assumes a high, upright spreading form, producing a shade that is not too dense for either lawn or street purposes. As a street

tree, it combines more desirable qualities than any other kind altho it grows too large for narrow streets. It prefers a reasonably fertile soil and plenty of moisture, and under these conditions, is a comparatively rapid grower.

MAPLE

No trees have been more widely used for planting the home grounds than the maples, as they are very satisfactory as shade, ornamental or street trees. The *white*, *silver* or *soft maple* is largely planted because of its rapid growth altho it is a short lived tree, very susceptible to borers and very subject to splitting and breaking. The *Norway maple* is the best tree for streets of moderate width and is a very desirable lawn tree.



The sugar maple (*Acer saccharum*) is one of the best shade trees for the home grounds.

It is adaptable to almost any soil, hardy and little subject to serious insects or diseases. It is one of the first maples to come into foliage in the spring and the last to drop its leaves in the fall although the foliage does not take on such brilliant color effects as the sugar and red maples. The red leaved variety of the Norway maple is an especially attractive tree when properly located on the home grounds. The common *red maple* thrives best on a moist soil and is sometimes used as a street tree although proving more suitable for lawn planting. In the fall, the coloring of the foliage is brilliant and in the spring its blossoms make a very attractive early spring effect. The *sugar maple* is the most widely known and one of the best of all the maples. It is a larger tree than the Norway maple although in many other respects so much like it that the two are often hard to distinguish. It thrives in cool situations and does not do as well under adverse soil conditions as the Norway maple. Its foliage becomes brilliantly colored in the fall, varying from yellow to scarlet. The *ash leaved maple* or *box elder* is frequently planted as a lawn tree and it accommodates itself well to adverse conditions. Like the silver maple, it is a short lived tree and not recommended for general planting.

Beech. The beech makes one of the most attractive and beautiful lawn trees. It requires a rich well-drained soil and grows rather slowly. The tree branches too low to produce a desirable street tree and the crown develops such dense foliage as to cast a heavy shade. During the winter, the light gray tint of the bark produces an excellent landscape effect while in the summer the silvery effect of the foliage is very beautiful. The *American beech* is largely used in this country although there are many ornamental forms of the European species such as the purple-leaved, cut-leaved and drooping beeches that are also popular. In planting upon the lawn, it is well to place these trees well away from the buildings or any spot where sunlight is desired either in winter or summer.



The Norway spruce (*Picea excelsa*) is one of the best evergreens for lawn planting

There are many other desirable kinds of deciduous trees that are all valuable under special conditions. Where quick temporary effects are desired the poplars are favorite trees while the attractive and graceful white birches, the golden willows, the stately sycamores or that much over planted catalpa, may sometimes find an appropriate setting in the home planting.

Evergreens

There are few home grounds where a few evergreens cannot be advantageously used for producing permanent screens, wind breaks, shelterbelts or hedges. They are very valuable if planted sparingly about the lawn as they contrast well with the deciduous trees and enliven the landscape effects during the

winter season. When used too much about the grounds, they are apt to produce a somber gloomy effect. They should never be used near the south or east side of buildings where they might shade them during the winter months. When placed well in the background of shrubs or deciduous trees, they give excellent results.

More spruces have been planted about home grounds than any other kind of evergreen. They are the fastest growing of all evergreens, are very hardy and do well on almost all kinds of soil. For quick effects under average conditions, the spruces are generally the best. They are much used for windbreaks and hedges as well as for planting about the lawn.

The *Norway spruce* is one of the best and most planted of all the spruces. It adapts itself well to any soil and almost any condition. The tree is clean, trim and bright both in summer and winter. As windbreaks upon the farm, it is one of the very best to plant. The trees grow high and thick and will live almost indefinitely. To maintain a thick growth at the base of the tree, it is often necessary to top them. Care must then be taken to prevent the formation and growth of two leaders. The beauty of all evergreens depends upon the preservation of a good healthy growth about the base of the tree whether they are used as hedges, windbreaks to lawn specimens.

The *Colorado blue spruce* is one of the most beautiful of the evergreens. The branches are produced in whorls around the trunk and the foliage is dense and of a bluish color. It thrives in almost any soil and locality, is a vigorous grower and does well in cold exposed situations. These trees are propagated in the nurseries by grafting cions from the finest bluest tree on vigorous seedlings, thus producing trees that are uniformly of a comparatively intense blue color. When seed is planted of this variety, some of the seedlings come true blue while others revert to the green.

White pine is the most valuable variety of pines both for planting about the home and for producing windbreaks or shelter belts. When planted for windbreaks, white pine should be placed further apart than other evergreens as the limbs grow out close to the ground and spread widely. The foliage is softer and finer than most other evergreens. The young trees look trim and neat all the year around while the old specimens are very picturesque.

The *Austrian pine* is a variety that is especially recommended for planting in the middle west. The growth is very dense and the trees grow to a large size. As planted singly on the lawns, the trees produce a beautiful effect while when planted in groups, the dark foliage shows in excellent contrast with spruce or other evergreens.

The *Hemlock* is also a very popular evergreen for lawn planting and for producing hedges. The foliage is very fine, producing a delicate effect and the trees are graceful and usually long lived. They stand shearing well when planted in hedges and will grow in the shade. For planting in groups with other evergreens they are also most excellent. The trees do best with a northern or eastern exposure and when protected

from the drying winds. They prefer a moist soil. Sometimes the trees have a tendency to grow quite straggly and should be frequently topped to maintain a dense growth of the lower branches.

Arbor Vitae. These evergreens, commonly known as the white cedars, are usually small growing, formal shaped trees. They are quite different in texture from other evergreens and very beautiful when properly used. The varieties vary much as to their form, size and color of foliage but the pyramidal varieties are most largely used. These may be especially valuable in grouping with other evergreens or in planting as screens or hedges. They stand pruning very well and can be trained to almost any shape. They prefer a moist deep soil but will thrive on any moderately fertile, well drained soil. They may be found growing wild in many of the low moist places in the central western states and if transplanted while still small, will produce excellent specimens.

TREES FOR SPECIAL PURPOSES

a. Street Planting.

<i>Acer saccharum</i> <i>Sugar Maple</i>	<i>Ulmus americana</i> <i>American Elm</i>
<i>Acer platanoides</i> <i>Norway Maple</i>	<i>Quercus palustris</i> <i>Pin Oak</i>
<i>Quercus rubra</i> <i>Red Oak</i>	<i>Tilia vulgaris</i> <i>Linden</i>

b. Trees for Specimen Planting.

<i>Acer platanoides</i> Schwedleri <i>Purple Norway Maple</i>	<i>Pyrus</i> (<i>In Variety</i>) <i>Flowering Crabapple</i>
<i>Magnolia soulangeana</i> <i>Soulange's Magnolia</i>	<i>Cercis canadensis</i> <i>Redbud or Judas Tree</i>
<i>Crataegus coccinea</i> <i>Scarlet Thorn</i>	<i>Betula</i> (<i>In Variety</i>) <i>Birch</i>
<i>Cladrastis lutea</i> <i>Yellow-Wood</i>	<i>Prunus cerasifera</i> Pissardii <i>Purple-leaved Plum</i>
<i>Cornus florida</i> <i>Flowering Dogwood</i>	<i>Morus alba pendula</i> <i>Tea's Weeping Mulberry</i>
<i>Quercus</i> (<i>In Variety</i>) <i>Oak</i>	<i>Thuja</i> (<i>In Variety</i>) <i>White Cedar</i>
<i>Populus nigra italica</i> <i>Lombardy Poplar</i>	<i>Picea</i> (<i>In Variety</i>) <i>Spruce</i>
<i>Sorbus americana</i> <i>Mountain Ash</i>	<i>Fagus</i> (<i>In Variety</i>) <i>Beech</i>

c. Trees for Exposed Lake Front.

<i>Caragana arborescens</i> <i>Siberian Pea Tree</i>	<i>Betula populifolia</i> <i>American White Birch</i>
<i>Betula pendula</i> <i>European White Birch</i>	<i>Crataegus Oxyacantha</i> <i>May Thorn</i>

Elæagnus angustifolia
Russian Olive

Pyrus baccata
Flowering Crab

Robinia pseudacacia
Black Locust

Pinus nigra austriaca
Austrian Pine

Pinus sylvestris
Scotch Pine

Picea canadensis
White Spruce

Cratægus Oxyacantha coccinea
Scarlet Thorn

Populus Eugenei
Carolina Poplar

Juniperus communis hibernica
Irish Juniper

Pinus montana *Mughus*
Dwarf Pine

Sorbus americana
Mountain Ash

Quercus macrocarpa
Mossy Cup Oak

Picea excelsa
Norway Spruce

Trees for Windbreaks

Pinus strobus
White Pine

Picea excelsa
Norway Spruce

Pinus resinosa
Red or Norway Pine

Pinus sylvestris
Scotch Pine

Thuja occidentalis
White Cedar or Arbor-Vitæ

VINES

Vines are as essential in harmonizing the house with its surroundings as the trees and shrubs we plant about it. When used in this manner, their principal function is to tone down the stiff, bold angles and bare surfaces of the house, producing a softness in the landscape that could be obtained in no other way. They are also valuable in covering steep banks, walls and fences; in the production of quick screens and in the covering of stumps or conspicuous trunks of trees.

The principal determinants to success in their use consists in selecting the proper places to plant the vines and the most appropriate vine for each place. As one frequently sees them used, they are covering spaces which would be far more beautiful if left open or leaving spaces exposed



Vines should enhance rather than conceal the architecture. The Boston Ivy (*Parthenocissus tricuspidata Veitchii*) is excellent for covering brick or stone work.

which should be covered, thus ruining the architectural features of the building. If correctly used, they should embellish rather than conceal the architecture. Porch columns, cornice lines, corners and angles of buildings should be left open here and there to reveal the form and design of the structure. By planting the less sightly portions and leaving the more beautiful elements of the design exposed, even the most ordinary looking houses may often become very attractive. The style of architec-

ture of the building will largely determine the character of the vine that should be selected to embellish it. The Dutchman's Pipe and Boston Ivy are more suitable for the development of the formal style of treatment than the freer growing vines such as the Clematis or Honeysuckle. Some of the flowering vines that do not produce a dense shade are particularly valuable for draping porch columns and training about windows or along the cornice of a porch. The flowering Clematis, Wistaria and Honeysuckle may often be used in this way, while on porches with a western exposure where a dense shade is desirable, the Virginia Creeper, Bittersweet or some of the vines producing a heavier foliage may be most desirable.

The planting of vines too close to the foundation of buildings is a frequent cause of failure in their development, as the cold wall and dry soil in such a location is not conducive to the growth of vines. It is better to plant them a foot to eighteen inches from the wall where the soil is moist and the roots may develop very vigorously. Exposure is also an important consideration in planting vines. Many of the vines such as Wistaria, Climbing roses and Clematis prefer a southeastern exposure, while the Virginia Creeper, Dutchman's Pipe and the Honeysuckles will thrive in shady places or with a northern exposure. Most vines, however, will flower more freely if given plenty of sunlight. The soil is a very important factor in growing vines successfully. They require a well drained soil, fairly moist and fertile, altho they often survive and struggle along on a poor soil. If the soil is poor, it should be replaced with rich loam, if this can be obtained. Otherwise, the soil should be enriched with well decomposed stable manure or commercial fertilizer, being careful that this material is not allowed to come in direct contact with the roots. After planting, the soil should be kept well cultivated, never allowing it to become hard and dry.

The dust and gases of the cities ruin many of the vines altho certain kinds such as Boston Ivy and Virginia Creeper seem to thrive even under these conditions. These vines, however, should not be allowed to climb upon wooden structures as they are apt to make the house damp and to cause the wood to decay. Vines should be found very acceptable in planting steep banks and thus preventing washing, while for covering bare and unsightly places under trees or over dead stumps, they may be made to produce excellent landscape effects. For covering stone walls, fences, arbors and in countless other ways, vines will be found most effective on the home grounds.

VINES FOR SPECIAL PURPOSES

a. Flowering Vines

Clematis Jackmanii	Roses, Wichuraiana Hybrids
<i>Purple Clematis</i>	Crimson Rambler
	Dorothy Perkins.
Clematis paniculata	Wisteria sinensis
<i>White Flowering Clematis</i>	<i>Chinese Wisteria</i>
Campsis radicans	Lonicera japonica Halliana
<i>Trumpet Vine</i>	<i>Hall's Japan Honeysuckle</i>

b. Vines for covering brick, stone and masonry

Parthenocissus tricuspidata Veitchii

Boston Ivy

Parthenocissus quinquefolia Engelmännii

Engelmann's Ampelopsis

Euonymus radicans

Climbing Euonymus

c. Vigorous climbing vines with heavy foliage

Celastrus scandens

Bittersweet

Lonicera (In Variety)

Honeysuckle

Campsis radicans

Trumpet Vine

Wisteria sinensis

Chinese Wisteria

Parthenocissus quinquefolia

Virginia Creeper

Aristolochia macrophylla

Dutchman's Pipe

Clematis paniculata

White-flowering Clematis



Speedwell (*Veronica longifolia* var. *subsessilis*), a beautiful perennial that should be more largely planted, producing beautiful spikes of intense lustrous blue color.

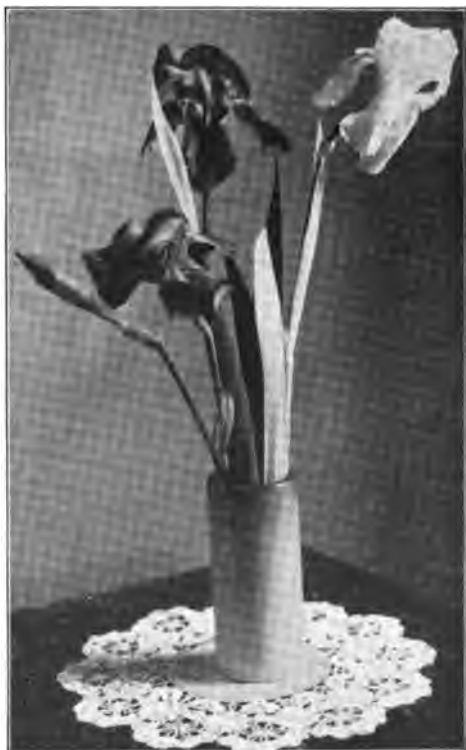
when planted along garden walks, walls, fences, against buildings and innumerable other places about the home grounds. In planting perennials they should be grouped or naturalistically massed as the effect produced by a colony is more attractive than the effect of a number of varieties scattered aimlessly with few plants of each together. Many of the perennials can be grown from seed. It is best to sow the seed in hotbeds or cold frames very early in the spring and the seedlings may be afterwards transplanted out of doors. Usually, however, they are propagated more easily by division.

Of the old time favorites, there are the foxgloves, larkspurs, hollyhocks, sweet-williams and phlox, all so characteristic of the early colonial gardens, that are just as desirable today. There are the columbines, blanket-flowers, coropsis, peonies and poppies, favorites for their beautiful flowering

HARDY PERENNIALS

Hardy perennials will always remain a most popular class of flowering plants. There is not a time during the whole flower season in which some hardy perennial is not in bloom, while during the months of July and August, when almost all the woody shrubs have ceased blooming, these plants are mainly depended upon for flower display. They are not fastidious about the soil they grow in altho many have a preference. Under trees or shrubberies, on sloping dry banks, along the borders of ponds or brooks, suitable perennials may be selected that thrive under such conditions. Their ability to thrive with little care makes them a very cheap and desirable class of plants for the home grounds.

Perennials are especially suited for border planting and when placed in front of shrubbery masses they are most effective. They are also



The Iris is one of the most satisfactory perennials for border planting and cut flowers.



Hardy native ferns as a foundation planting along the north side of a porch.



Hollyhocks should be planted against buildings, walls or in front of higher growing plants.

effects. For planting about ponds or upon deep moist soil, there are the iris, forget-me-not, lily-of-the-valley, bee balm, trillium, cardinal flower and the ornamental grasses, while for late summer and fall effects there are the hardy chrysanthemums, golden glow, asters and anemone or wind flower. So from early spring until fall when the ground is finally covered with a blanket of snow, the hardy perennials are lending their color tints to brighten their surroundings.

PERENNIALS FOR SPECIAL PURPOSES

a. Standard Types for General Planting.

Iris germanica

German Iris

Phlox paniculata

Garden Phlox

Paeonia

Peony

Delphinium

Larkspur

Aster

Aster

Rudbeckia laciniata

Golden Glow

Coreopsis lanceolata

Lance-leaved Tickseed

Dianthus barbatus

Sweet William

Aquilegia

Columbine

Chrysanthemum

Chrysanthemum

Althæa rosea

Hollyhock



Purple Loosestrife (*Lythrum Salicaria roseum*), a late summer flowering perennial that delights in a moist soil, planted amid shrubbery,

b. Little Known Perennials That Should Be More Largely Used.

Achillea Ptarmica var. Boule de

Neige

Ball of Snow

Monarda didyma

Bee Balm

Hosta plantaginea

Day Lily

Gypsophila paniculata

Baby's Breath

Papaver orientale

Oriental Poppy

Phlox subulata

Moss Pink

Hibiscus Moscheutos

Marsh Mallow

Gaillardia aristata

Blanket Flower

Narcissus poeticus

Narcissus

Anemone japonica

Japanese Windflower

Iberis sempervirens

Evergreen Candytuft

Aquilegia formosa hybrids

Columbines

Chrysanthemum coccineum

Feverfew

Lobelia cardinalis

Cardinal Flower

Eulalias (In Variety)

Plume Grasses

CHOICE VARIETIES OF PEONIES

White

Early

*Festiva Maxima**Madame de Verneville*

Mid-season

Baroness Schroeder

Late

*Marie Lemoine**Couronne d'Or*

Deep Pink

Early

Alexandriana

Mid-season

Modeste Guerin

Late

*Livingston**Monsieur Boncharlat Aine*

Pink

Early

Delicatissima

Mid-season

*Therese**Madame Emile Lemoine**Albert Crousse*

Late

Dorchester

Red

Early

Augustin d'Hour

Mid-season

Felix Crousse

Late

Henry Demay

CHOICE VARIETIES OF PHLOX

Mrs. Jenkins (*early white*)Fraulein Von Lassburg (*large white*)Jeanne d'Arc (*late white*)Bridesmaid (*white, carmine center*)Henri Murger (*white, carmine center*)Europa (*white, carmine eye*)W. C. Egan (*soft pink*)Selma (*pink, red eye*)Pantheon (*brilliant rose*)Rynstrom (*deep salmon pink*)



Goat's-Beard (*Aruncus sylvestris*), grown for its large, showy panicles of white flower and does well in a somewhat shady situation.

Siebold (*bright scarlet*)

Rosenberg (*reddish violet with red eye*)

B. Comte (*purple*)

CHOICE VARIETIES OF GERMAN IRIS

Atropurpurea (*purple*)

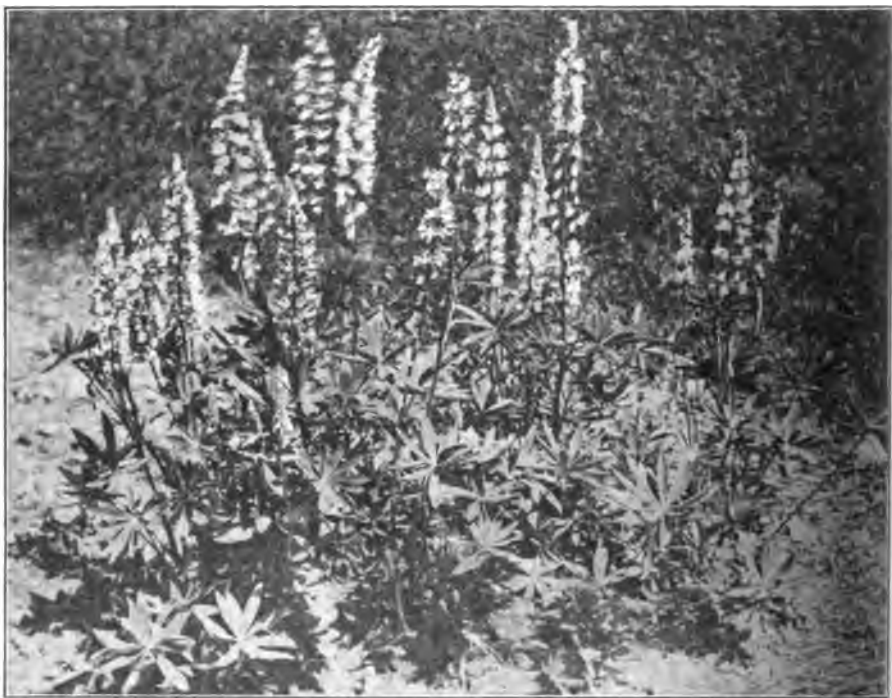
Fairy (*ivory white, pale violet veins*)

Florentina (*white, tinged with blue*) early

Gracchus (*yellow and crimson*) early

King of Iris (*yellow and brown*)

Madame Chereau (*white, tinged blue*)



Lupine (*Lupinus polyphyllus*), a very effective hardy perennial on any good garden soil, producing long spikes of deep blue flowers.

Madame Pacquette (*bright rosy claret*) early
 Maori King (*rich golden yellow*)
 Mrs. H. Darwin (*white, violet veins*) early
 Pallida Dalmatica (*lavender, blue*)
 Queen of May (*lilac, pink*)
 Silver King (*silvery white*) early

ANNUALS

Annuals are always desirable on every home grounds as they are most essential in producing the best and most continuous display of flowers during the summer months. Their great variety and their adaptability to all soils and conditions as well as the many beautiful ways in which they may be used about the home grounds make them almost indispensable. As cut flowers they are the particular favorites of nearly every one and the planting of the home grounds without a few such annuals as sweet peas, asters, pansies, or nasturtiums would hardly seem complete.

Annuals are also especially valuable in producing quick effects as well as for enhancing the grounds of the renter or person who has not the means to plant the more expensive perennial or permanent kinds. When planted in the foreground of shrubs or among perennial, annuals are most pleasing but it is an unfortunate mistake to grow annuals in flower beds dotted over the lawn. In the free and natural style of landscape gardening they should be planted in naturalistic beds about the borders of the home grounds and when so arranged, enhance the beauty of the entire



Cobea (*Cobaea scandens*) is one of the most rapid growing of the annual vines and hence excellent for quick effects.

grounds. They may also be appropriately placed as border plantings along garden walks, about the base of buildings or in front of walls or fences.

Annuals are fortunately very easy to grow. Almost all of them may be grown successfully by sowing the seeds of the plants directly in the permanent beds, but usually better plants are obtained by seeding them in hotbeds or cold frames or in boxes of earth in the house, from which they may later be transplanted to the beds. Frequently the plants come into blossom a month earlier when grown in this manner and hence a longer flowering season is obtained.

The kinds of annuals are so numerous that a selection is largely a matter of personal preference. The pansies, if sown in July or August, produce an excellent early spring display, while if seeded indoors in late winter and planted in a partially shaded location, they should bloom continuously during the summer. The sweet alyssum, dusty-miller, candytuft and lobelia make excellent edging plants, while for summer flower displays, nasturtiums, petunias, coxcomb, stocks, verbenia, annual phlox, poppies, salvia, zinnias and balsams are all easily grown and very effective. Portulaca is most accommodating in covering dry sandy banks and the heliotrope, marguerites, stocks and mignonette in furnishing the gardens with their delightful fragrance. For large foliage effects there is nothing to compare with ricinus or castor oil bean, while the large beau-

tiful colored flower spikes of the snap dragon compare very favorably with the beauty of any of the perennials. In late summer, the asters, cosmos and burning-bush add their brilliance to the flower display and most all of such annuals continue to bloom till the frosts of the fall dismantle their robes of beauty.

Annuals Valuable for Cut Flowers

Asters, late branching	Bachelor Buttons
Sweet Peas	Zinnias
Cosmos, early flowering	Snapdragon
Pansies	Corn Flower
Nasturtiums, dwarf	Heliotrope
Mignonette	Stocks
Dianthus	

Annuals for Garden Effects

For edgings:

Sweet Alyssum
Lobelia
English Daisy
Dwarf Cockscomb
Dusty Miller
Ageratum
Candytuft

For bedding effects:

Annual Phlox
Verbena
Annual Poppies
Petunia, var. Rosy Morn
African Daisy
Marigold
Balsam
Celosia
Portulaca

Tall growing annuals:

Castor Oil Bean
Sunflower
Cosmos, late

Annual Vines

Cyperus vine	Wild Cucumber
Balloon Vine	Morning Glory
Gourd, Ornamental	Hop Vine
Climbing Nasturtiums	Moon Vine
Scarlet-runner Bean	Cobea



BEAUTIFYING

Farm Home Grounds

AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE COLLEGE
Of Agriculture and Applied Science
LANDSCAPE ARCHITECTURE SECTION
East Lansing, Michigan



The Station

THE INSPIRATION

The attainment and enjoyment of beautiful home grounds are among the greatest privileges associated with country living. A beautiful home environment constitutes one of the greatest existing sources of inspiration for the finer and better emotions of life. Beautiful trees, shrubs, lawns, and flowers surrounding ones abode constitute a perpetual source of human satisfaction. With all the wonderful developments of the modern city, man has not discovered an adequate substitute for the enjoyment of the elements that constitute a beautiful landscape.

Planning and developing beautiful grounds about the farm home is not an especially difficult task. No elaborate effects are needed, nor are they appropriate. A simple unpretentious development to harmonize the home grounds with the larger landscape, but of a somewhat more cultivated, subdued, and refined character, should be the controlling aim.

BEAUTIFYING THE FARM HOME GROUNDS

By C. P. HALLIGAN

The development of beautiful grounds about the farm home begins with the selection of the site for the house. The location selected for the house should first of all be sightly, that is, it should be a pleasing spot to live upon. This infers that it should be somewhat higher than its surrounding ground, with plenty of light and pleasing views or scenes available from it. A beautiful vista of a distant lake or river, of a picturesque valley, or even a large expanse of landscape with its



Fig. 1.—The selection of a sightly spot for the house is the first important step in the development of beautiful home grounds.

changing seasonal effects will enhance the enjoyableness of the place without adding to its cost. Pleasing landscape vistas tend to make pleasing home grounds.

The exposure of the site is also an important consideration. A bountiful supply of sunlight makes a dwelling bright, cheerful, and attractive, and exercises a beneficial influence in maintaining healthfulness. Sunlight is particularly welcome during the winter months. An ideal site possesses a good exposure to the south so that the more important

rooms of the house may be arranged to obtain the most sunlight at this period of the year. A location that is more or less protected from the north and west with an open exposure to the south and east is most desirable. On many farms, such a site sheltered from the north and west by a hill, woods, or other natural features, is available which, if selected as a site, would help much to shelter the house from the harsh winds of the winter months.

A slight knoll generally makes an ideal site for a building. If the land is level, much the same effect may be secured by setting the building rather high on its foundation, and grading up to it. A little additional filling will obtain at least a portion of these advantages. On farms which are hilly and rough, ideal sites may be found, sites, too, which would prove of very little value for farming purposes.

The house should be located an ample distance back from the public road. It has been a common error in the past to place the farm house



Fig. 2.—A well selected home site with a systematic arrangement of farm buildings.

too near the highway to give the privacy, dignity, and beauty which may be had by a proper treatment of the grounds where an ample area for a front lawn is available.

Since the living room, dining room, and other sections of the house should have a southern exposure, it is well to have the larger lawn area, the most desirable vistas, and pleasing landscape effects available from this side of the house. Sufficient space should be left, however, between the house and the boundary along the least desirable side for the placement of the drive and walks to prevent the necessity of breaking the unity of the lawn area by their presence upon the more important side.

Drainage

The site for a house should possess good soil and air drainage. Low areas where the under-drainage is poor or where inefficient surface drainage may exist should be avoided. A good natural circulation of air is more desirable than a site into which the cold damp atmosphere collects without channels through which it may drain away.

Divisions of Grounds

A home grounds may be considered as being composed of a number of major divisions each of which commonly serves rather definite functions. The more important of these divisions in relation to their functions are the entrance division, the service division, and the living division.

The entrance division usually includes the front lawn, the entrance drive, and walks. It generally is that portion of the property which the public sees from the highway and from which visitors receive their impression of the entire place. The general appearance of this division should be trim and tidy, simple, dignified, hospitable, and pleasing.



Fig. 3.—A few well placed trees are often the basis of all that is beautiful about the home grounds.

The service division usually constitutes the back yard. It is that portion of the grounds required for performing the necessary but often unsightly requirements of a dwelling. It is necessarily in close relationship with what may be considered the service section of the house. It should provide an entrance and exit to the service division of the house and to the garage. It should include a convenient and well planned laundry yard for drying clothes and for such other functions as are needed about a dwelling. The vegetable garden may be included in this division or otherwise directly adjoining it. The unsightly appearance of many back yards is often due to a lack of arrangement of the service division to serve conveniently and efficiently these necessary functions.

The living division may be considered as that portion of the grounds where the family may enjoy out-of-doors the privacy of family life in

a most pleasing environment without being in full view of the service division, of the neighbors, or of every passer-by upon the highway. It should be in direct communication with the living room or living porch and is usually developed on the farm in the form of a spacious lawn area appropriately planted with shrubs and flowers and sheltered by one or more groups of wide spreading shade trees.

A study of the general arrangement and coordination of these divisions is the first step in the development of a home grounds. Such a study answers the question as to what purposes the home grounds are to serve and what general arrangements of the grounds will serve these purposes in the most convenient and pleasing manner.



Fig. 4.—A farm home set well back from the highway with an open unbroken lawn and a tasteful shrubbery planting.

Grading

There is usually more or less grading which should be done before seeding and planting. In determining the grades, it is well to keep clearly in mind the fundamental objects of grading which are to produce a pleasing setting for the house, to provide surface drainage away from the building and for every portion of the grounds, and to smooth off the small irregularities of the surface of the lawn.

A building will generally possess an ideal setting from the standpoint of grades when it appears to be located on the summit of a slight knoll with the land sloping gracefully away from it on all sides. Except in some very special cases, a level lawn should not be constructed. In grading, endeavor to preserve the slight natural slopes and curves of the land, remembering that nature never produces perfectly level surfaces. This part of the grading should be carefully studied and considered before starting the work. The way in which it is done will determine whether a graceful, pleasing, natural lawn or a stiff, restrained, unsatisfactory one is secured.

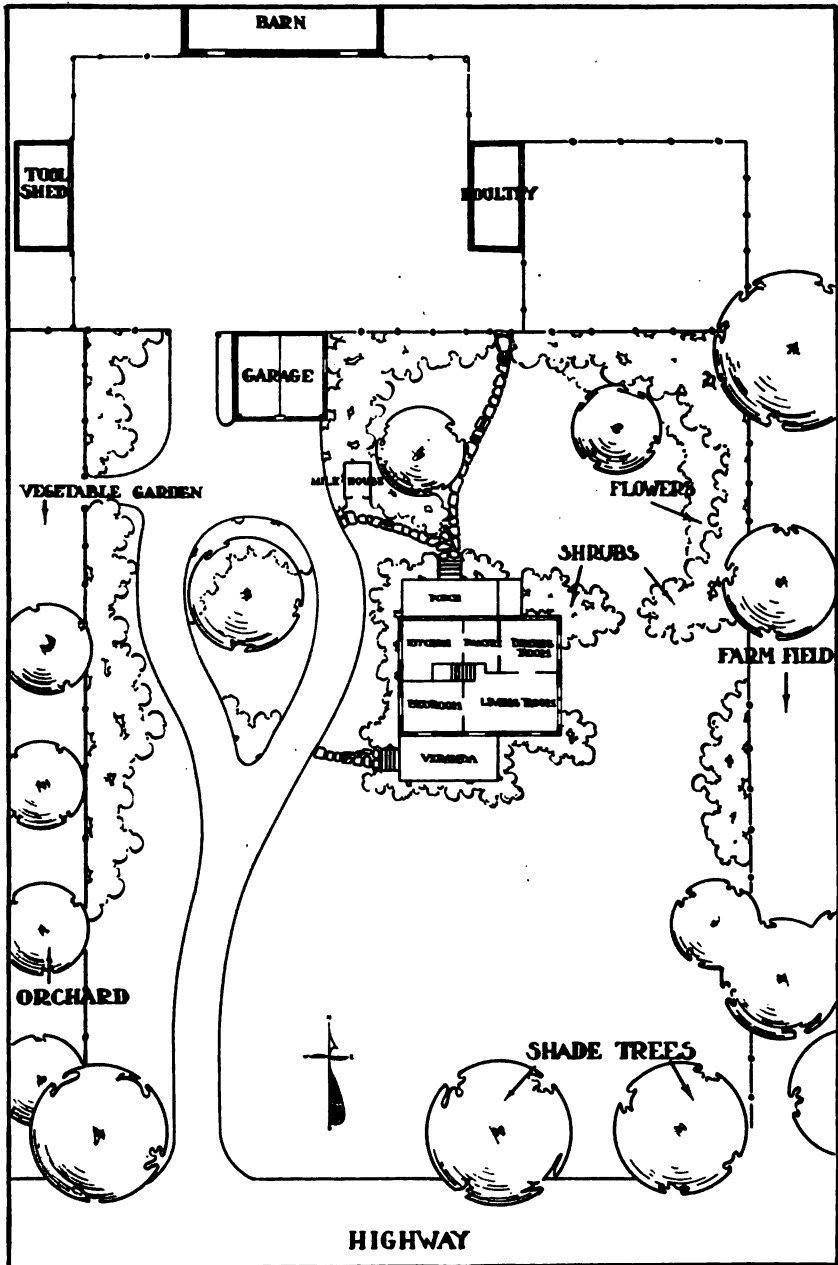


Fig. 5.—A planting design of farm grounds showing well designed entrance drive, systematic arrangement of the farm buildings and general arrangement of shrubs and shade trees to develop a sightly home grounds.

In doing the grading work, care should be exercised to save the top soil. Where cuts or fills are necessary, the top soil should first be removed and then replaced after the cuts or fills have been made. A top soil of six inches or more in depth is required for a lawn while a foot or more of top soil is desirable for the planting areas. If this work can be performed in the fall, settling will take place over winter. In the spring, the final work of grading may be accomplished. One should pick off all the stones which have come to the surface during the winter and then work the surface of the land with a harrow or rake. If it can then be rolled, the small uneven spots will become very apparent and they can then be leveled off with a hand rake. By re-rolling and re-raking the land in this way, the surface can be made as smooth and even as desired. In this manner, a more permanently smooth grade of the lawn is attained than if the seeding was done directly after grading and before settling had taken place.

Lawns

A good lawn is a most important feature of a well developed home grounds. It is often referred to as the canvas upon which the picture is created. It should possess openness and extent and should be framed with plantings of trees and shrubs about its borders. Never should it be cluttered with meaningless plantings of specimen shrubs and trees as is sometimes done. Being such an essential and permanent source of beauty, its construction and maintenance deserves the most careful consideration.

The soil for a lawn should be of good texture and should contain plenty of plant food and enough humus to retain moisture. A strong clay loam or sandy loam with a clay subsoil which contains enough sand or gravel for under-drainage most nearly approaches these conditions. When a lawn is to be constructed upon light sandy soil, a top-dressing of two inches or more of clay with a heavy application of well rotted manure should be mixed with the first three or four inches of sand. Frequently, in building a house, the soil excavated from the cellar is spread about, covering the good top soil with a subsoil which is infertile, of poor texture, and generally undesirable as a surface soil for lawns or plantings.

Preparation of Seed Bed

The proper preparation of the seed bed begins with the plowing or spading of the soil to a depth of six inches or more, depending much upon the depth of the top soil. It should then be thoroughly pulverized by harrowing, firmed by rolling, and smoothed by hand raking. After the surface has been rolled and re-raked until it is as smooth as possible, it should be finally rolled and raked to a very shallow depth just previous to seeding.

The application of a heavy dressing of well decomposed stable manure, thoroughly worked into the soil to a depth of two to four inches will tend to improve the physical texture of the soil as well as its chemical composition. Fresh stable manure contains so many weed seeds that it is not desirable for this purpose. If conditions are such that seeding can be deferred for a couple of weeks, many weed seeds in the manure and surface soil will germinate and may be destroyed by cultivation before seeding.

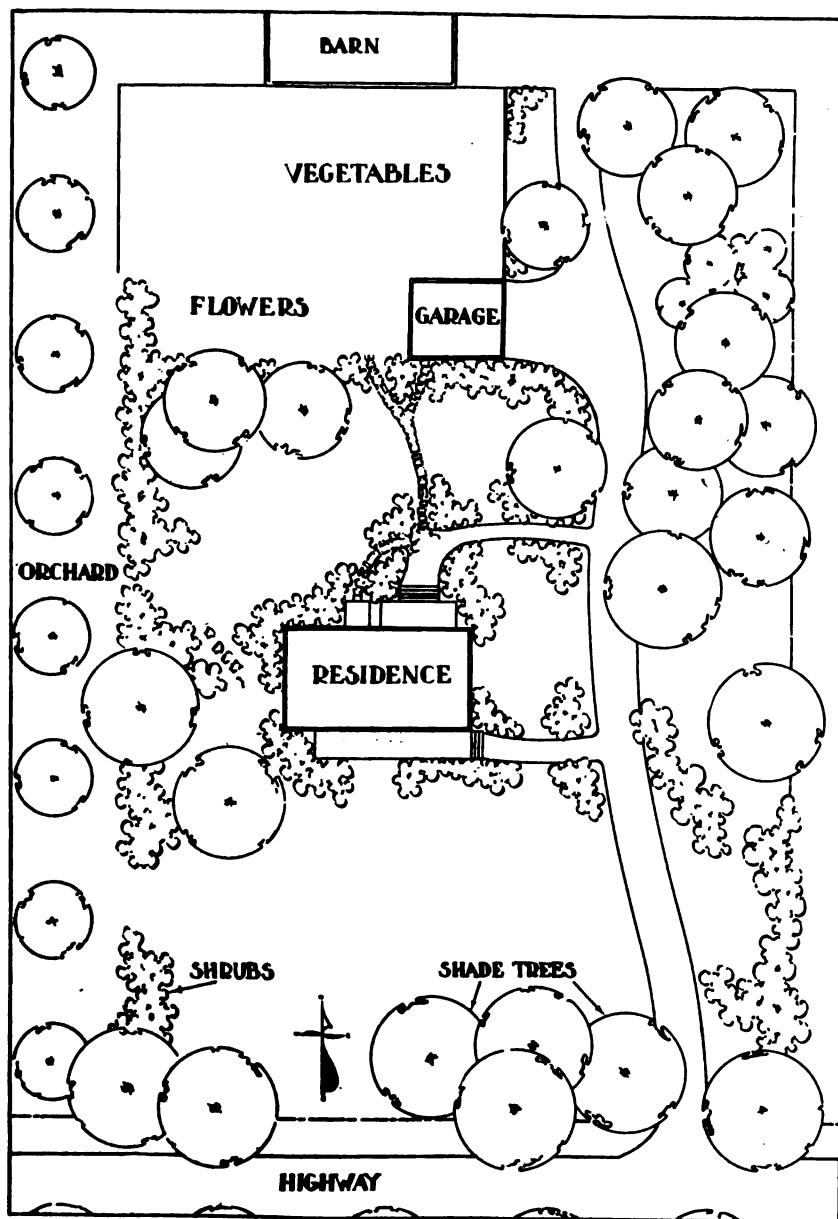


Fig. 6.—A design of walks, drives and plantings of a farm grounds where the buildings had already been placed.

Chemical fertilizers may be used to advantage, but whether they should be applied before seeding time or later depends upon the form of nitrogen used in the fertilizer. When nitrate of soda or sulphate of ammonia is to be used, it is better to defer its application until the grass germinates.

Varieties of Grasses

The question of the best varieties of grasses to use for a lawn as well as the best fertilizers for maintaining it should always be considered in relation to the condition of the soil.

For alkaline soils Kentucky bluegrass, otherwise known as June grass, which is our most common lawn grass, is a most cosmopolitan variety and is especially suited to moderately fertile soils having good drainage and plenty of sunlight.



Fig. 7.—A typical ill-arranged home grounds showing the front lawn cluttered with meaningless plantings.

Although the most favorable habitat of Kentucky bluegrass is upon the limestone soils, it has been found by recent investigations that this grass is less adversely affected by an acid soil condition than most of the troublesome lawn weeds.

Redtop is better adapted to soils that are somewhat infertile, dry, and poorly drained and is not adversely affected by acid soil conditions. It is not, however, a turf forming grass and should be used primarily in a mixture as a nurse crop or for its quick effect. It is better than timothy or oats for a nurse crop. It is commonly used with Kentucky bluegrass, bentgrass or red fescue, all of which are turf forming kinds. White clover used at the rate of two to five pounds per acre is sometimes mixed with bluegrass and redtop for establishing lawns upon alkaline or sweet soils.

For acid or sour soils, there are many species of bentgrasses well suit-

ed to the production of ideal lawns. The differences between the several species are not great. Rhode Island bent, German bent, Velvet bent, and Creeping bent, the last more commonly established by the planting of stolons, are the most common species for lawns. Under favorable conditions, they produce the most dense and perfect turf and, with the least hand weeding, the most weedless lawns. However, they require too much care and attention for the average farm home grounds.

Chewings' Red Fescue is another kind of grass indifferent to soil acidity and producing a very fine texture turf. It does particularly well in partial shade and withstands drought and infertility better than most other lawn grasses. Its fine texture and light color tend to create a spotted effect when mixed with other grasses.



Fig. 8.—A simple harmoniously designed farm house set well back from the road with a wide unbroken front lawn framed along the boundaries and back with trees.

Rough bluegrass (*Poa trivialis*) is another species particularly suited to locations that are shaded. It is quite similar in texture and color to Kentucky bluegrass and redtop. Therefore, it is usually preferable to Red fescue when it is to be mixed and grown with these kinds upon strong soils.

Undesirable Varieties

Timothy, orchard-grass, and other coarse textured grasses are very undesirable in lawn mixtures. Quack-grass is not especially troublesome as it will not withstand frequent close clippings commonly given to lawns and will be crowded out under favorable conditions by the other kinds of grasses. Therefore, it is not necessary to pull out the roots of quack-grass in establishing a lawn where the land is infested with it

before seeding. It should, however, be kept out of the shrubby borders.

The choice of grasses for use in establishing a lawn should be determined by the amount of care to be given the lawn, its fertility and exposure, as well as by the condition of the soil from the standpoint of acidity. In Michigan, upon the farm home grounds where the amount of care given the lawn is necessarily very limited, such commonly used varieties of grasses as Kentucky bluegrass, redtop, and Rough bluegrass are generally the most satisfactory. Equal parts of Kentucky bluegrass and redtop make a satisfactory mixture for open lawn areas, using Rough bluegrass with such a mixture when portions of the lawn are shaded.

For unmixed sowings, the quantities used vary with the kind. For 1,000 square feet of surface, two pounds of redtop is sufficient, or two and one-half to three pounds of bentgrass, Kentucky bluegrass, or Rough bluegrass, or three to five pounds of Chewings' Red Fescue.

If the area to be sown is small and the conditions of soil and exposure somewhat variable, it is advisable to use a high grade prepared lawn mixture obtained from a reliable seedman. About three to four pounds of such a mixture should be used to 1,000 square feet of lawn area.

The purchaser of grass seed must depend on the reliability of the dealer since the general appearance tells little to the uninitiated. Many grass seed mixtures contain timothy, orchard-grass, weed seed, and a relatively high percentage of chaff and other debris. They are also apt to be low in germination.

Time For Seeding

Late August or early September is the most desirable time to seed lawns. Early spring is a less favorable season, particularly from the standpoint of weed control. It is the time, however, when most lawns are seeded and the earlier it is done after the ground has thawed out and settled the better. If watering facilities are at hand, however, seed may be sown at any other period of the growing season although some difficulty may be experienced in maintaining moisture in the soil for young seedlings in hot weather. It is desirable to seed new lawns at such times as will permit them to become well established before the heat and drought of summer or the freezing, heaving, and thawing of winter and early spring.

In sowing grass seed, uniform distribution should be sought. This is more easily attained when the air is calm as in early morning or at sunset. If half of the seed is sown in parallel strips covering the entire area, and then the other half is sown in similar parallel strips at right angles to the first, a more even seed distribution will be secured.

Raking or brushing the soil after sowing may be desirable if one is very careful to cover the seed very uniformly and lightly. More often, such a practice results in an uneven depth of planting the seed. Rolling after seeding is more beneficial as it presses the soil firmly about the seeds and thus tends to insure a uniform supply of moisture. The use of ground peat moss or mull as a surface mulch, spread uniformly over the surface after seeding, will help in maintaining a uniformly moist condition and tend to promote germination.

Where watering facilities are at hand, the soil should be sprinkled

after rolling with special care against washing. This sprinkling should be repeated as often as may be necessary to keep the surface soil moist. During bright, hot weather this may necessitate two or three sprinklings a day. With bright weather and with at least a moderate temperature, seed will germinate, if kept uniformly moist, in a surprisingly short time.

After germination and before the roots of the seedlings have become well established, they are very subject to drought, especially upon a bright day with a hot wind.



Fig. 9.—The selection of a slightly spot for the farm dwelling, sheltered on the north and west, but with a good exposure to the south, makes an ideal condition for the farm home.

FERTILIZERS

The question of the best fertilizer for maintaining a lawn should be considered in relation to the food elements most commonly deficient in the soil and to the effect of the fertilizer upon the acidity of the soil. Nitrogen is the element most commonly deficient and phosphorus is frequently not present in sufficient quantity. Potash is sometimes deficient in the soil. In contradiction to common thought, an acid soil is more favorable for the production of a nearly weedless vigorous lawn than a soil of neutral or alkaline character. This is because most of the troublesome weeds of the lawn are more favored in their growth by an alkaline or neutral condition than lawn grasses, or, in other words, are less tolerant of an acid soil condition.

Some of the land in Michigan, being of a limestone origin, is strongly alkaline. It is doubtless impractical to attempt to change such soils to an acid condition. Most of the surface soil in Michigan is either acid

or neutral in character. Liming such soils, or the use of those forms of commercial fertilizer which tend to neutralize them is not to be recommended. Upon such soils, it is especially desirable to use such forms of commercial fertilizer as will not only furnish plant food but will also tend to maintain them in an acid condition.

Since nitrogen seems to be the most generally deficient food element in the soil for growing grass, sulphate of ammonia, a quickly available form of fertilizer furnishing nitrogen to the soil and leaving an acid residue, has been found most beneficial. Continued applications of this fertilizer over a period of years tend to create and maintain an acid condition. Superphosphate, a commercial form of phosphorus, does not create an acid condition, but, in soils already acid, it does not tend to



Fig. 10.—The living division of a farm grounds bordered by groups and masses of hardy trees and shrubs.

neutralize them as does the use of some other sources of phosphorus. Muriate of potash, a commercial form of potash, likewise is neutral in its effect; while wood ashes, containing lime as well as potash, would tend to create and maintain a neutral or alkaline condition of the soil.

The control and eradication of such common weeds as plantains, dandelions, crab grass, and chickweed by hand digging or spraying is not usually practicable on the small home grounds. Reinfestation takes place so readily by seeds blown in from near-by places or by seeds which are added to the soil when stable manure is used that these practices prove of little value. They do not correct the basic conditions which have contributed to the presence of the weeds in the lawn. Stimulating the growth of the grass by heavy feeding with fertilizers which tend to

maintain soil acidity has proved to be a more helpful means of weed control.

Sulphate of ammonia as a fertilizer should be applied in early spring just as growth begins. It may be used at the rate of four to six pounds per 1,000 square feet or from 150 to 250 pounds per acre. As there is some danger of burning the grass with this material, it is better to mix it with two to three times its bulk of sand, compost, or finely screened topsoil and to apply it at a time when the grass is dry. Watering directly after it has been spread tends to prevent burning. Another application should be given in early September and at any intervening period when the grass appears more yellowish than normal or otherwise in need of stimulation. It is apt to be especially injurious, however, if applied during the heat of summer. Other quickly available forms of nitrogenous



Fig. 11.—The bare and bleak appearance of many farm buildings as seen from the public highways, might be much improved by the appropriate planting of hardy shrubs and trees.

fertilizers such as nitrate of soda might be used in a similar way and may prove very beneficial although their effect upon the acidity of the soil from continued use may be very different.

Where potash or phosphate is needed as fertilizer, but one annual application is generally made. It is considered best to apply them in early spring just as growth commences. Under these conditions it is usually best to purchase a complete commercial fertilizer which tests relatively high in nitrogen, that is about 8 per cent, with about 6 per cent phosphate and 4 per cent of potash. Such a fertilizer should be applied at the rate of from 400 to 500 pounds per acre, or two to three pounds per square rod.

Use of Manure

The use of undecomposed stable or barnyard manure as commonly applied to the lawn during the fall, winter, or spring months cannot be

recommended. Experiments have demonstrated that areas seeded to Kentucky bluegrass and fertilized by an annual application of undecomposed stable manure have become more nearly monopolized by weeds each year. Large lumps of undecomposed stable manure upon the lawn tend to smother out the grasses beneath them and later make a favorable medium for the germination and growth of the weed seeds contained in them.

Well decomposed stable manure, however, is very valuable in maintaining lawns. For this purpose, it should ordinarily have stood for two or three years. For clay soils, particularly with bent grasses, this



Fig. 12.—Plantings of high growing shrubs to screen the view of nearby barns from the house.

composted form of manure makes an ideal top-dressing when mixed with two parts of clean sharp sand and supplemented with five pounds of sulphate of ammonia to each cubic yard of the mixture. Creeping bent lawns should be top-dressed each spring and early fall with about one cubic yard of this prepared mixture to one thousand square feet of lawn area. Frequently Creeping bent lawns may be much benefited by lighter top-dressings of this character at intervening periods. All grasses would be much benefited by a top-dressing of this kind each spring. Watering the lawn directly after the application, especially if the mixture contains sulphate of ammonia or nitrate of soda, is desirable to prevent burning.

The secret of maintaining a good lawn is to begin with a good top soil, to provide efficient soil drainage, to prevent the lawn from drying

out by thorough watering when necessary and to keep the lawn well supplied with plant food. Rolling the lawn each spring, and, with Creeping bent lawns, a light rolling at least two or three times during the growing season, is also very beneficial.

After the grass has grown to a height of four to six inches it should be given the first clipping, which should not be very close. A scythe is even better for this cutting than a lawn mower as it will not pull out the young plants or cut as close as the mower. The grass should be cut frequently enough thereafter to permit the clippings to remain on the lawn without being unsightly. These clippings, if allowed to remain, will form a dense mulch around the base of the plants and tend to

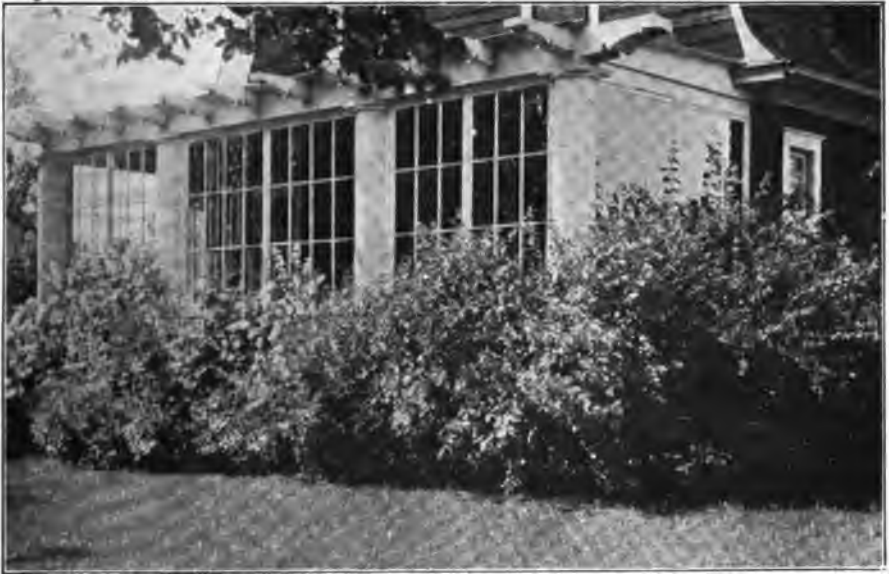


Fig. 13.—Plantings of low growing hardy shrubs about the base of the sun-parlor tends to harmonize it with the lawn.

protect the soil from drying out during the summer months. Lawns should be cut frequently but not too close.

Weed Control

The use of arsenate of lead powder in the proportion of two to five pounds per 1,000 square feet has been recommended as a means of controlling earth worms and grubs in bentgrass lawns as well as a means of controlling Crab grass, Mouse-ear chickweed, and Annual bluegrass. For these purposes it should be thoroughly mixed with a bushel of fine moist sand or sifted top soil, for each 1,000 square feet. An initial application of five pounds is frequently followed with two pounds the succeeding year. Early June is a seasonable time for applying it as a means of controlling crab grass. For the control of Annual bluegrass and chickweed, it may be applied in early spring or at any time thereafter until about the middle of September.

It is also recommended at the rate of two pounds per 1,000 square feet in new bent lawns as a means of controlling these weeds as well as of grubs and earth worms. When applied just previous to seeding, it tends to retard the growth or germination of bent grasses but this influence is soon overcome.

Since the use of arsenate of lead for these purposes is a recently developed practice, much information about its value and reliability under variable conditions will be found in the near future.

No single known method gives complete weed control. Every condition in the practice or establishing and maintaining lawns has its influence upon the presence of weeds. Under the best of conditions, it



Fig. 14.—Plantings should be so arranged as to enhance the architecture of the house.

will be necessary to do some hand weeding after the grass has become established but good practice will reduce this labor to a minimum.

The two chief causes for moss in a lawn are poor drainage and impoverished soil. The best method of ridding the lawn of moss is to improve the drainage, if it is defective, or to apply fertilizer. Ammonium sulphate or nitrate of soda may be used separately or better still a complete fertilizer containing a high nitrogen content. Spraying with a 5 per cent solution of iron sulphate will generally kill the moss but will not correct the soil condition to prevent its reappearance.

Plantains and dandelions may be eradicated by spraying with an iron sulphate solution made by dissolving one and one-half pounds of iron sulphate in two gallons of water. The spray should be applied when the foliage is dry. This may burn the grass to some extent but such injury

will soon be overcome. It may be necessary to apply the spray from three to five times at intervals of about three weeks. Over small areas such weeds may be killed by placing a drop of commercial sulphuric acid in the crown of each plant. This may be expeditiously applied by the use of an oil can with a long snout.

Walks and Drives

Walks and drives are elements of utility rather than of beauty in the development of the farm home grounds. They are more expensive to construct and maintain than the same area in lawns or plantings and are not as pleasing to look upon. They also tend to break the unity of the



Fig. 15.—A shrubbery bordered entrance drive to the farm grounds.

area through which they pass. Therefore, their extent should be confined to the actual needs of the grounds.

Walks and drives should be designed to lead in a convenient and apparently direct way to the most common points of destination. They are the directing lines for traffic upon the grounds. In addition to being the most reasonable lines for traffic to follow, they should be pleasing in their development and should be harmonious with the landscape effect of the grounds.

The entrance drive to the farm home should enter the property near one of the front corners of the lawn area. This should be the one toward town unless such a selection for the entrance would result in the development of a drive through the most desirable portion of the lawn area to be reserved for the living division. The drive starting in a line

perpendicular to the highway should approach the house in a sweeping, graceful line which will tend to keep the drive from intruding upon the front lawn area. Sometimes it may be desirable to construct the drive immediately in front of the house but, usually, a more reasonable plan is to carry the line of the drive toward the back of the property. In either case, the drive should pass within a reasonably convenient distance of the main entrance of the house as well as of the service entrance. From these points, it should be extended in such a manner as to provide for driving directly to the garage, to the farm yard, or to lead back to the highway. Usually this suggests the development of a turn-around drive.

If this is designed it should also be so arranged as to accommodate



Fig. 16.—A simple unpretentious but well developed farm entrance.

service traffic from the highway to the farm yard along that side of the turn-around most distant from the house. (See Fig. 5).

Usually as farm houses are designed and as farm drives are laid out, the main entrance to the house is in front while the entrance drive is along the side of the house. Under these conditions, the main entrance to the house is not conveniently accessible from the entrance drive and is, therefore, seldom used. Likewise the front walk leading directly from the highway to the front door is inconvenient and seldom used. It would seem that the most reasonable location for the main entrance to the house would be upon the side adjacent to the entrance drive rather than upon the front facing the public highway. Likewise, the entrance walk should be laid out from the main entrance of the house to the nearest or most convenient point of access along the entrance drive.

Where good drainage exists, the surface of the drive should be somewhat lower than the adjacent lawn. This makes the drive less apparent

as viewed from any point across the lawn and provides for the development of a pleasing graceful roll in the grade from the lawn elevation down to the drive. Abrupt banks along the side of the drive or public highway should be cut back for a considerable distance to form mild, pleasing grades that will unite harmoniously and appear naturally a part of the larger lawn grade.

The construction of a walk or drive should be such as to provide a most acceptable surface at the seasons of the year that they are to be used. The principles of their construction consist in first providing good sub-drainage, the lack of which is a most common cause of the breaking up of drives and walks. Tile draining of the beds upon which they are constructed may be necessary or the use of a base of gravel or cinders some six inches to a foot in depth may be required below the materials used in their construction. The second principle is to construct them so as to be impervious to water and as to provide good surface drainage. Muddy drives and walks lack these requisites. The third principle is based upon the fact that good walks or drives are composed of a hard impervious stone packed tightly together with only enough of other material to fill the spaces between the stone and to bind them.

The stones forming the basic structure furnish the supporting strength to a walk or drive and provide a surface to withstand the wear of traffic. Except with macadam or crushed stone drives, sharp, clean, coarse sand is the most available material which meets the requirements of a good filler for the spaces between the stone. The binder used to hold the stone and sand in place and to make the surface less pervious to water varies with the several kinds of walks or drives which are to be constructed. With gravel drives and walks, the binder is the clay contained in the sand or gravel, a small percentage of which is necessary for this purpose. When the drives are constructed of concrete, the cement used is the binder; while asphalt is the binder of an asphaltum drive. In all of these cases, however, the percentage of stone used, its imperviousness to water, and its degree of hardness determine to a large degree the strength and permanence of the construction.

Bank run gravel usually contains too much sand and clay in proportion to the stone to be most suitable for drives. Screened gravel or, better still, washed gravel are more suitable. Where hard stone is indigenous to a locality, it constitutes an ideal basis for road construction but unfortunately such stone is not usually found in southern Michigan.

Cinders from factories and power plants make good drainage material for placing under drives, particularly upon clay soils. Where gravel or crushed stone is not within the means of the home owner for the construction of drives, cinders alone are often a great improvement over a dirt drive. However, cinders are readily crushed and quickly ground down to a dust with much traffic and do not have the supporting strength of stone for heavy loads.

Planting

The plantings about the farm house determine to a large extent its degree of attractiveness. One can hardly visualize a pleasing farm home without a reasonable number of trees, shrubs, and hardy flowers tastefully arranged about it. Otherwise, a bare, bleak, unsheltered effect is

very apt to be the most displeasing characteristic of the place. It may be said that the less decorative the architectural features of the house the greater is the relative importance of the plantings. Hence, it is very important that considerable attention be given to the planting about the average farm home.

Before going ahead with this work one should first ascertain the functions or purposes of the plantings to be made. In planting farm grounds, let it be realized that the aim is to create a picture which has as its elements, a farm house and other buildings, roads, walks, lawns, and other more or less separated elements. To unite these several disconnected parts into the production of one harmonious composition is



Fig. 17.—Shrubs planted in the corners of the entrance porch generally prove effective.

the leading function of the plantings. To arrange the plantings about the house so the building may seem a natural outgrowth of the spot and to so arrange the plantings on the grounds that each and every planting may seem dependent upon the presence of every other planting or other element in the design is the purpose of the planting. When it can be realized that these plantings are made not primarily for the sake of their own individual beauty but more because of their relationship to the design as a whole, to the picture about to be created, the first principle to guide one in planting has been mastered.

The planting of each and every grounds is a new problem, differing in certain respects

from every other. No definite rules, therefore, can be given to guide one in the work and no plan may be drawn to serve all places but a few general principles underlie all problems. Before any planting design is made, the grounds should be studied in reference to the general arrangement that is most serviceable. The style of architecture of the house, the position and character of any large trees already on the grounds, the slope and general character of the land, and any other natural condition should be studied to "see what kinds of beauty, what general character of pleasing appearance these conditions most readily suggest." Each home grounds is more or less suggestive of a certain type of beauty which may be brought forth and emphasized with the least difficulty.

After perceiving this type of beauty, one may so proceed that the necessary details of arrangement will emphasize and enhance the character thus selected. One will find certain elements which detract from the beauty of the grounds, which are defects in the picture; these should be screened by the use of plantings. Views within the grounds, such as

of the henhouse, barnyard, a boundary fence, service drive, and other unsightly spots; views beyond the grounds, as of a neighbor's barn and other views hardly pleasing and acceptable to the sight, all these should be entirely hidden from view by the use of plantings or at least partially screened to minimize their unsightliness.

There are other elements in the design which should be just as carefully preserved and enhanced by plantings. The most pleasing lines and portions of the house, for example, may be emphasized and carefully preserved to the view. A wide sweep of open lawn, with a border and



Fig. 18.—Shrubs should be arranged in naturalistic groups and masses along the borders of the lawn areas.

background of trees and shrubbery, is always a pleasing and acceptable sight. Vistas without the grounds, as of a distant woods, a winding river or a neighboring farm house, and even the travel upon a public road, are often welcome sights which add to the pleasure and value of the grounds. It is especially important that these vistas be carefully preserved from the living rooms of the house, not always from the parlor but from those rooms where the family spend the major portion of their time. The plantings then serve a very important function by concealing the defects in these places and by enhancing the parts that are most pleasing. With this thought in mind one can readily imagine

how beautiful and attractive some of the ordinary looking farms of today may become by the proper use of plantings.

Plantings, when improperly used, may detract from the value and looks of the farm as well. The effect of a well-designed farm house is very frequently ruined by the improper location or arrangement of plantings. Trees planted too thickly or too closely in front of the house, a lack of harmony in the design of the grounds with that of the house, or plantings placed to hide the house from its most pleasing point of view are a few of the many causes which often spoil the effect of a well designed house. Let it be remembered that plantings are to enhance rather than to detract from the expression already given by the design of the house and they should harmonize it with its site.

There are three general rules for guidance in arranging the plantings:

First, avoid straight lines. The general effect of all lines in planting should be graceful and natural rather than stiff, formal, or artificial. Plantings should seem to be a natural outgrowth of the spot rather than a crude piece of man's handiwork.

Second, arrange the plants in groups and masses, selecting few kinds and many of each rather than many kinds and few of each.

Avoid planting meaningless, isolated specimens over the lawn. Naturalistic masses and groups of plants are necessary to give structural character to the design and each group or mass should consist of many specimens of but a few kinds, rather than one or two specimens of several kinds. The particular shrubs selected should be used in several groups and masses, not precisely in the same combinations but sufficiently so that the effect of one planting may be harmonious with the others. In this manner, unity of effect may be obtained.

Third, plantings should be massed about the base of the buildings, grouped about the junctions of curves in the walks, massed about the boundaries and corners of the property but not usually along the front boundary of the property.

When arranged in this way, an open lawn bounded with naturalistic plantings of shrubbery and trees will be the general effect.

These plantings may perform other desirable functions also. They may be arranged to shelter the house from the winter storms and the summer heat or to frame desirable vistas and thus accentuate their attractiveness. Masses of shrubs may be used to replace an undesirable fence or hedge. They may be planted to prevent people from wearing paths across the lawns and to unify the walks, buildings, and other elements of the grounds into one harmonious design.

The planting should be done early enough in the spring so that the shrubs will be well established before the heat and drought of summer overtakes them. In preparation for planting, the beds should be dug to a depth of a foot or more and well manured. The distance of setting the shrubs depends largely upon the size of their growth. Japanese barberries should be planted two and one-half feet apart, spireas three and one-half feet and lilacs about four to five feet. In three years, when set at these distances the branches should be so intermingled that their individuality in the beds is lost and a unified mass effect produced. In transplanting, keep the roots moist and prevent them from being exposed to the sun and wind any longer than necessary. Set the plants slightly deeper than they stood in the nursery and pack the best fine

soil firmly about the outspread roots. If the soil is dry, water after planting. It will help to compact the soil about the roots and keep them moist. The tops may then be pruned back to balance the loss of roots, leaving a few large buds on each of the strongest shoots.

WHAT VARIETIES TO SELECT

Shrubs

The choice of varieties is perplexing because there are so many handsome shrubs all of which seem most desirable to the home garden maker. A few of the good old standbys that are handled by every nurseryman and sold by the millions, that are sure to give one his money's worth and are safest for the beginner to use are listed.

First of all there is the Van-houtte Spirea, the most popular spring flowering shrub. Its remarkable freedom of bloom and beautiful foliage produced on branches drooping gracefully to the ground make it exceedingly attractive. This spirea, which is only one of a large group of related plants, is very hardy and grows well in any moderately rich and well drained soil. It attains a height of about six feet and is particularly suited to mass plantings about buildings and porches, along walks and drives or around the boundaries of the lawn. Another very widely used kind is Bridal-wreath Spirea, a double flowering form with leaves that resemble those of the Prunus or plum. The Garland Spirea, although not as well known, is a most desirable early spring flowering shrub with small delicate foliage and white flowers. It is particularly suitable for planting in the foreground of other higher and coarser growing shrubs. For summer flowering, the genus is represented by the Froebel Spirea that blooms in late June. Its flowers are produced in corymbs or flat flower heads of a rosy crimson color, sometimes approaching a magenta. Where a low shrub is wanted for summer effect, this is one of the best.

It would be hard to name a shrub as cosmopolitan in its characteristics, combining as many desirable qualities as the Japanese barberry. It is one of the few shrubs that are attractive at all seasons of the year. In the spring and summer its graceful branches are clothed with small



Fig. 19.—Shrubs massed about the base of trees relieve the bareness of the trunks and tend to harmonize them with the surrounding lawn.

yellowish green leaves that change to a bright scarlet in the fall. Later they are shed to expose the scarlet berries that enliven the landscape all winter. While a sandy loam soil seems ideal for the barberry, it thrives equally well on practically all types of soils that are well drained and it seems equally cosmopolitan as to exposure. The San Jose scale, plant lice, and other pests seem carefully to avoid it. The graceful form it assumes and its low habit of growth make it suitable for filling in small spaces such as between walks or buildings or for planting in front of spireas and other higher growing shrubs. There is nothing better



Fig. 20—Lilacs produce beautiful effects when planted in groups or masses with an appropriate background of trees.

to use where a low ornamental hedge is desired than this barberry that shifts for itself after it is once established. This species is not a host for wheat rust and may be planted in any part of the state.

The lilac is the most common and still most indispensable of the shrubs. There are so many desirable improved varieties of this old time flower that, even if one were given a few bushes of the old-fashioned type by some well meaning neighbor, one could not afford to plant them because the new improved kinds are so superior. They produce larger and better flowers over a longer season. Therefore, it is well to go to a nurseryman and get an improved variety that will be

superior to this old-fashioned type. There one may become acquainted with Marie Legraye, a beautiful white; Mad. Lemoine, the best double white; Dr. Regel, a handsome rosy pink; Chas. X, an attractive rosy lilac; Toussant L'Ouverture, a very dark carmine colored in bud, turning to a violet-red when in full bloom and an endless list of other improved sorts of the old-fashioned lilac. Then, the other species of lilac include at least one other type that should be used. For general landscape effects it is to be preferred to any of the first mentioned group because it is more graceful in its growth with smaller leaves and large, open, gracefully drooping panicles of reddish purple flowers. This is the lilac



Fig. 21.—The Ash-leaved Spirea is desirable for planting steep banks.

listed in the catalogues as *Syringa chinensis*. The Persian lilac is very similar to it but more dwarf in its growth. For screens and backgrounds of shrubbery masses, used in uniform colors rather than mixed, lilacs produce a most attractive effect in late spring.

The *Philadelphus coronarius* or Mockorange is another large, high growing shrub that is prized especially for its fragrant white flowers so abundantly produced in June. It is too high-growing and coarse textured for planting immediately about the house. Fortunately the Lemoine Mockorange is lower growing and finer textured, making it an excellent shrub for nearby plantings of about four to five feet in height. *Philadelphus virginal* is a newer variety with double waxy-white flowers,

rather coarse in texture and not quite as high growing as the common Mockorange. The yellow leaved varieties are not as vigorous, high-growing, or free flowering. There are many other varieties and species of this shrub and as a rule they are hardy, generally free from insects and fungous troubles, and a most cosmopolitan class of plants.

The bush honeysuckles are very acceptable in border plantings about the home grounds. While many produce beautiful spring flowering effects in white or pink, they are prized more for the red coral-like berries that color these plantings in midsummer after most of the shrubs are through blooming. The Morrow honeysuckle is one of the best varieties for this purpose while the Rosy tatarian is one of the most effective in flower.

A class of popular shrubs often confused with the honeysuckles, possibly because of the trumpet shaped flowers, is the Weigela or Diervilla. Although the latter is now considered the standard botanical name, in most catalogues it is listed as Weigela. Of the many varieties in pink, white, or red that are now offered of this group, the old-fashioned pink flowering, Weigela rosea, continues to lead in popularity. At the Graham Experimental Farm, Grand Rapids, the pink flowering variety, Gustav Mallot, has proven of outstanding beauty in bloom. Another variety, Weigela Eva Rathke, is also used considerably by those familiar with its qualities. This variety has carmine-red flowers and somewhat darker foliage and it blossoms over a longer period than the former and almost as profusely in the shade as in full sunlight. It is very acceptable, therefore, for planting along the north side of buildings or in other partly shaded situations. Unfortunately, it is a poor grower.

Of the many other shrubs worthy of consideration, there are the golden bells, or Forsythias, whose yellow blossoms are produced in the spring even before the leaves, so early in fact that the flowers are often caught by late freezes; also the Slender Golden currant, *Ribes aureum*, with its sweet fragrant blossoms; and the Rugosa rose, with its luxuriant foliage and ever-blooming habit. There is no trouble about having enough kinds to select from but the difficulty is in limiting the list to those that are best. For the home garden maker, it will be wise to rely chiefly on the old standard sorts.*

SHRUBS FOR SPECIAL PURPOSES

Shrubs for Hedges

<i>Acanthopanax pentaphyllum</i>	<i>Lonicera morrowi</i>
Five-leaved Aralia	Morrow Honeysuckle
<i>Berberis thunbergii</i>	<i>Rosa hugonis</i>
Japanese Barberry	Hugonis Rose
<i>Deutzia lemoinei</i>	<i>Rosa rugosa</i>
Lemoine Deutzia	Rugosa Rose
<i>Hydrangea peegee</i>	<i>Rosa rugosa hybrida</i>
Peegee Hydrangea	var. Grootendorst
<i>Ligustrum amurense</i>	<i>Spiraea vanhouttei</i>
Amur Privet	Vanhoutte spirea
<i>Thuja occidentalis</i>	
American Arborvitae	

Shrubs for Border Planting**a. Low Growing**

<i>Spiraea Bumalda</i> var.	<i>Kerria japonica</i>
<i>Anthony Waterer</i>	Kerria
Anthony Waterer Spirea	<i>Spiraea thunbergi</i>
<i>Berberis thunbergi</i>	Thunberg's Spirea
Japanese Barberry	<i>Symphoricarpos racemosus laevigatus</i>
<i>Deutzia gracilis</i>	Garden Snowberry
Slender Deutzia	<i>Symphoricarpos vulgaris</i>
	Coralberry

b. Medium Growing

<i>Deutzia lemoinei</i>	<i>Ribes odoratum</i>
Lemoine Deutzia	Golden Currant
<i>Philadelphus lemoinei</i>	<i>Rosa rugosa</i>
Lemoine Mockorange	Rugosa Rose
<i>Rhodotypos kerrioides</i>	<i>Spiraea prunifolia</i>
Jetbead	Bridalwreath spirea
<i>Spiraea vanhouttei</i>	
Vanhoutte spirea	

c. Tall Growing

<i>Diervilla florida</i>	<i>Lonicera tatarica rosea</i>
Rose Weigela	Rosy Tartarian Honeysuckle
<i>Euonymus americana</i>	<i>Philadelphus coronarius</i>
Brook Euonymus	Mockorange
<i>Forsythia intermedia</i>	<i>Syringa</i> (In Variety)
Border Forsythia	Lilac
<i>Lonicera morrowi</i>	<i>Viburnum</i> (In Variety)
Morrow Honeysuckle	Viburnum

Shrubs for Specimen Use

<i>Caragana arborescens</i>	<i>Cydonia japonica</i>
Siberian Pea-tree	Flowering Quince
<i>Cercis canadensis</i>	<i>Prunus cerasifera</i> var. <i>pissardi</i>
Red-bud	Purpleleaf Plum
<i>Chionanthus virginica</i>	<i>Prunus glandulosa</i>
White Fringetree	Flowering Almond
<i>Euonymus alatus</i>	<i>Rhus cotinus</i>
Winged Euonymus	Common Smoketree
<i>Exochorda grandiflora</i>	<i>Tamarix</i> (In Variety)
Common Pearlbrush	Tamarix

*See Special Bulletin No. 154 entitled "Hardy Shrubs for Landscape Planting in Michigan" for more detailed information concerning shrubs.

Shrubs for Exposed Lake Front

<i>Elaeagnus argentea</i>	<i>Rosa rugosa</i>
Silver Thorn	Rugosa Rose
<i>Rhamnus cathartica</i>	<i>Rosa setigera</i>
Common Buckthorn	Michigan Prairie Rose
<i>Rhus</i> (In Variety)	<i>Syringa vulgaris</i>
Sumach	Lilac
<i>Philadelphus coronarius</i>	<i>Tamarix</i> (In Variety)
Mockorange	<i>Viburnum opulus</i>
	High-bush Cranberry

Shrubs for Shady Situations

<i>Calycanthus floridus</i>	<i>Symphoricarpos racemosus laevigatus</i>
Common Sweet Shrub	Garden Snowberry
<i>Cornus</i> (In Variety)	<i>Symphoricarpos vulgaris</i>
Dogwood	Coralberry
<i>Ligustrum amurens</i>	<i>Weigela Eva Rathke</i>
Amur Privet	<i>Viburnum</i> (In Variety)

Shrubs for Sandy Soils

<i>Berberis thunbergi</i>	<i>Rosa setigera</i>
Japanese Barberry	Michigan Prairie Rose
<i>Caragana arborescens</i>	<i>Rhus canadensis</i>
Siberian Pea-tree	Fragrant Sumach
<i>Forsythia intermedia</i>	<i>Rhus glabra</i>
Border forsythia	Smooth Sumach
<i>Lonicera tatarica</i>	<i>Rhus cotinus</i>
Tartarian Honeysuckle	Purple Fringetree
<i>Rosa rugosa</i>	<i>Tamarix</i> (In Variety)
Rugosa Rose	Tamarix
<i>Spiraea vanhouttei</i>	
Vanhoutte spirea	

Shrubs for Steep Banks

<i>Rosa setigera</i>	<i>Sorbaria sorbifolia</i>
Michigan Prairie Rose	Ash-leaved Spirea
<i>Rhus</i> (In Variety)	<i>Symphoricarpos vulgaris</i>
Sumach	Coralberry

ROSES**Hybrid Perpetuals**

For Cut Flowers

(Half Hardy, Requiring Some Protection Over Winter)

Frau Karl Druschki (White)
 George Arends (Pink)
 General Jacqueminot (Red)
 J. B. Clark (Red)
 Mrs. John Laing (Pink)

Hybrid Teas

For Cut Flowers

(Requiring Protection Over Winter)

Souvenir de Claudius Pernet (Yellow)

Kaiserin Augusta Viktoria (White)

Gayety (Yellow)

Miss Cynthia Forde (Pink)

Mme. Segond Weber (Pink)

Ophelia (Salmon Pink)

Radiance (Pink)

Red Radiance (Red)

Robert Huey (Red)

Mme. Edouard Herriot (Orange)

Talisman (Reddish Orange)

Roses for Landscape Effect

Polyantha roses in variety

Rosa hugonis

Rosa rubiginosa (Sweetbriar)

Rosa rubrifolia (Red-leaved rose)

Rosa rugosa (Japan rose)

Rosa rugosa hybrida var. Grootendorst

Rosa setigera (Michigan Prairie rose)

Mary Wallace rose

TREES

*"Among all the materials at our disposal for the embellishment of country residences, none are at once so highly ornamental, so indispensable or so easily managed as trees or wood."**

Trees are especially valuable as screens, windbreaks, backgrounds for buildings, for shade, and for their own individual beauty in a design. By a natural arrangement of trees in the improvement of the country home grounds, places which might otherwise seem bare and bald may be made interesting and often picturesque. They should be disposed around our houses in groups, masses, and as single trees in such a manner as to rival the most beautiful scenery of nature as well as to provide all the comforts and conveniences of a rural home.

In selecting trees for home planting, form, hardiness, adaptability, rapidity of growth, shade production, freedom from insects and diseases, neatness, and general beauty should be considered.

In purchasing trees, one should obtain healthy, well shaped trees.

*Section 111, Chapter on "Wood," Treatise on the Theory and Practice of Landscape Gardening, by A. J. Downing.

This book was the first landscape gardening book published in America and is considered one of the best at the present time. It started a great popular movement toward the development of beautiful home grounds and its author by his many writings and landscape gardening work probably exerted more influence in the development of American horticulture than any other single figure.

It is generally a waste of time and money to set poor, deformed trees. Wild trees may be used but they are less likely to withstand the shock of transplanting than those that have been previously transplanted in the nursery. It is possible to set out trees as large as a foot in diameter but the cost is so great that few can afford to transplant trees of such size. As a rule, smaller trees transplant more successfully. Trees for street planting should be about two inches in diameter and 10 to 12 feet in height.



Fig. 22.

In transplanting trees, as many roots as possible should be preserved because trees with large root systems do much better than those whose roots have been severely pruned.

As the tree is purchased from the nursery, the top or crown is usually already formed. This general shape of the top should be preserved in pruning after transplanting. If the root system has been severely pruned, it will be necessary, however, to cut back the branches of the top to maintain a balance between the roots and foliage, although it is better to maintain this balance by saving the roots than by sacrificing branches.

During transplanting, the roots of the trees should never be allowed to become dry. If a choice is allowed, transplant a tree on a cloudy day as a bright sun or a dry wind exhausts the stored up moisture. As soon as the trees arrive from the nursery they should be "heeled-in" in moist soil until planting.

The hole in which the tree is to be set should be slightly larger than is necessary to accommodate the roots without bending or twisting them. If the site, as is often the case, is on "made" ground, re-

move at least a cubic yard of the soil or rubbish and provide as much good loam. In planting the tree, spread a layer of fine mellow soil mixed well with about one-third its bulk of well decomposed stable manure, if available, in the bottom of the hole. Never use fresh manure. The tree should then be planted by packing the fine soil firmly about the roots, setting the tree about two inches deeper in the soil than it stood in the nursery. If the soil is dry at planting time, watering directly after planting will be beneficial as it will help much in packing the soil about the roots and supplying moisture.

DECIDUOUS TREES

Oaks

Of all the trees that may be used on the home grounds, the oaks are undoubtedly the best shade trees for, with few exceptions, they are beautiful, long lived, and little subject to damage by insects and diseases. Though oaks are generally considered slow growing, some make very rapid growth when given good care. The white oak is probably the best known and one of the longest lived trees. It is slow in growth and is in such small demand that nurseries do not generally grow it. The red oak seems to be satisfied with a comparatively poor soil, develops a straight sturdy trunk and a symmetrical top, and its foliage turns a brilliant color in the fall. It is the most rapid growing of the oaks and good for both lawn and street planting. The scarlet oak is much like the red oak, although it is smaller and does well even on poorer soil. Its foliage becomes brilliantly colored in the fall, hence the name. The pin oak grows taller and more slender than most other oaks with usually a straight trunk. The leaves are small and quite persistent through the winter. This tree thrives upon moist ground but grows equally well where the soil is quite dry. It is especially suitable for street planting and also makes a very desirable lawn tree, the foliage being less brilliantly colored than the red oak although beautiful during all parts of the growing season.

Elms

The American elm is probably the stateliest tree grown in this country. Usually the tree assumes a high, upright, spreading form and produces shade which is not too dense for either lawn or street purposes. As a street tree, it combines more desirable qualities than any other kind although it grows too large for narrow streets. It prefers a reasonably fertile soil and plenty of moisture, and under these conditions, is a comparatively rapid grower.

Maple

No trees have been more widely used for planting the home grounds than the maples, as they are very satisfactory as shade, ornamental or street trees. The *white*, *silver*, or *soft maple* is largely planted because of its rapid growth although it is a short lived tree, very susceptible to borers and very subject to splitting and breaking. The *Norway maple* is the best tree for streets of moderate width and is a very desirable lawn tree.

It is adaptable to almost any soil and is hardy and little subject to serious insects or diseases. It is one of the first maples to come into foliage in the spring and the last to drop its leaves in the fall, although the foliage does not take on such brilliant color effects as the sugar and red maples. The red leaved variety of the Norway maple is an especially attractive tree when properly located on the home grounds. The common red maple thrives best on a moist soil and is sometimes

used as a street tree although more suitable for lawn planting. In the fall, the coloring of the foliage is brilliant and in the spring its red blossoms make a very attractive early spring effect.

The *sugar maple* is the most widely known and one of the best of all the maples. It is a larger tree than the Norway maple although in many other respects so much like it that the two are often hard to distinguish. It thrives in cool situations and does not do as well under adverse soil conditions as the Norway maple. Its foliage becomes brilliantly colored in the fall, varying from yellow to scarlet. The ash leaved maple or box elder is frequently planted as a lawn tree and it accommodates itself well to adverse conditions. Like the silver maple, it is a short lived tree and not recommended for general planting.



Fig. 23.—The Norway Maple is one of the best shade trees for the home grounds.

Beech

The beech makes one of the most attractive and beautiful lawn trees. It requires a rich well drained soil and grows rather slowly. The tree branches too low to produce a desirable street tree and the crown develops such dense foliage as to cause a heavy shade. During the winter, the light gray tint of the bark produces an excellent landscape effect while in the summer the silvery effect of the foliage is very beautiful. The American beech is largely used in this country although many ornamental forms of the European species such as the purple-leaved, cut-leaved, and drooping beeches are also popular. In planting upon the lawn, it is well to place these trees well away from the buildings or from any spot where sunlight is desired either in winter or summer.

Many other desirable kinds of deciduous trees are valuable under special conditions. Where quick temporary effects are desired, the poplars are favorite trees while the attractive and graceful white birches, the golden willows, the stately sycamores, or the much over-planted catalpa may sometimes find an appropriate setting in the home planting.

EVERGREENS

There are few home grounds where a few evergreens cannot be advantageously used for producing permanent screens, wind breaks, shelterbelts, or hedges. They are very valuable if planted sparingly about the lawn as they contrast well with the deciduous trees and enliven the landscape effects during the winter. When used too much about the grounds, they are apt to produce a somber effect. They should never be used near the south or east side of buildings where they might shade them during the winter months. When placed well in the background of shrubs or deciduous trees, they give excellent results.

More spruces have been planted about home grounds than any other kind of evergreen. They are fast growing, very hardy, and do well on most kinds of soil. For quick effects under average conditions, the spruces are generally the best. They are much used for wind-breaks and hedges as well as for planting in groups about the lawn.



Fig. 24.—The Norway Spruce is one of the best hardy evergreens for lawn planting.

Norway Spruce

The Norway spruce is one of the best and commonest planted of all the spruces. It adapts itself well to any soil and almost any condition. The tree is clean, trim, and bright both in summer and winter. For windbreaks upon the farm, it is one of the very best. To maintain a thick growth at the base of the trees, it is often necessary to top them. Care must then be taken to prevent the formation and growth of two leaders. The beauty of all evergreens depends largely upon the preservation of a good healthy growth about the base of the tree whether they are used as hedges, windbreaks, or lawn specimens.



Fig. 25.—Norway Spruce planted in a line as a windbreak.

Colorado Blue Spruce

This spruce is one of the most beautiful of the evergreens. The branches are produced in whorls around the trunk and the foliage is dense and bluish. It thrives in almost any soil and locality, is a vigorous grower, and does well in cold exposed situations. These trees are propagated in the nurseries by grafting cions from the finest bluest trees on vigorous seedlings, thus producing trees that are uniformly of a comparatively intense blue color. When seed of this variety is planted, some of the seedlings come true blue while others revert to the green.

White Pine

White pine is the most valuable species of pines both for planting about the home and for producing windbreaks or shelter belts. When planted for windbreaks, white pine should be placed farther apart than other evergreens as the limbs grow out close to the ground and spread

widely. The foliage is softer and finer than most other evergreens. The young trees look neat all the year around while the old specimens are very picturesque.

Austrian Pine

The Austrian pine is especially recommended for planting in the middle west. The growth is very dense and the trees attain a large size. As planted singly on the lawns, the trees produce a beautiful effect while when planted in groups, the dark foliage shows in excellent contrast with spruce or other evergreens.



Fig. 26.—Spruce and other hardy evergreens when arranged in naturalistic groups as a windbreak are more harmonious and beautiful in the landscape.

Hemlock

The hemlock is a beautiful evergreen but does not thrive well in this State. The foliage is very fine, producing a delicate effect and the trees are graceful and usually long lived. They stand shearing well when planted in hedges and will grow in the shade. For planting in groups with other evergreens, they are excellent. The trees do best with a northern or eastern exposure and when protected from the drying winds. They prefer a moist soil and a moist atmosphere. Sometimes the trees have a tendency to grow quite straggly and should be frequently topped to maintain a dense growth of the lower branches.

Arbor Vitae

These evergreens, commonly known as the white cedars, are usually small growing, formal shaped trees. They are quite different in texture from other evergreens and very beautiful when properly used. The varieties vary much as to their form, size and color of foliage but the pyramidal varieties are most largely used. These may be especially valuable in grouping with other evergreens or in planting as screens or hedges. They stand pruning very well and can be trained to almost any shape. They prefer a moist deep soil but will thrive on any moderately fertile, well drained soil. They may be found growing wild in many of the low moist places in the State.

TREES FOR SPECIAL PURPOSES

a. Street Planting

<i>Acer saccharum</i>	<i>Ulmus americana</i>
Sugar Maple	American Elm
<i>Acer platanoides</i>	<i>Quercus palustris</i>
Norway Maple	Pin Oak
<i>Quercus rubra</i>	<i>Tilia vulgaris</i>
Red Oak	Linden

b. Trees for Specimen Planting

<i>Acer platanoides schwedleri</i>	<i>Pyrus</i> (In variety)
Schwedler Maple	Flowering Crab
<i>Magnolia soulangeana</i>	<i>Cercis canadensis</i>
Saucer Magnolia	American Redbud
<i>Crataegus oxyacantha splendens</i>	<i>Betula</i> (In variety)
Paul Double Scarlet Hawthorne	Birch
<i>Cornus florida</i>	<i>Prunus cerastifera pissardi</i>
Flowering Dogwood	Purpleleaf Plum
<i>Quercus</i> (In variety)	<i>Morus alba pendula</i>
Oak	Weeping Mulberry
<i>Populus nigra italica</i>	<i>Thuja</i> (In variety)
Lombardy Poplar	White Cedar
<i>Sorbus americana</i>	<i>Picea</i> (In variety)
Mountain Ash	Spruce
<i>Fagus</i> (In variety)	
Beech	

c. Trees for Exposed Lake Front

<i>Caragana arborescens</i>	<i>Betula populifolia</i>
Siberian Pea-tree	Gray Birch
<i>Betula pendula</i>	<i>Crataegus oxyacantha</i>
European Weeping Birch	English Hawthorne
<i>Elaeagnus angustifolia</i>	<i>Crataegus oxyacantha pauli</i>
Russian Olive	Paul English Hawthorne
<i>Pyrus baccata</i>	<i>Populus Eugenei</i>
Flowering Crab	Carolina Poplar
<i>Robinia pseudacacia</i>	<i>Juniperus communis hibernica</i>
Common Locust	Irish Juniper
<i>Pinus nigra austriaca</i>	<i>Pinus montana mughus</i>
Austrian Pine	Mugho Pine
<i>Pinus sylvestris</i>	<i>Sorbus americana</i>
Scotch Pine	Mountain Ash
<i>Picea canadensis</i>	<i>Quercus macrocarpa</i>
White Spruce	Mossycup Oak
<i>Picea excelsa</i>	
Norway spruce	

d. Trees for Windbreaks

<i>Pinus strobus</i>	<i>Thuja occidentalis</i>
White Pine	Arborvitae or White Cedar
<i>Picea excelsa</i>	<i>Pinus resinosa</i>
Norway Spruce	Red or Norway Pine
<i>Pinus sylvestris</i>	
Scotch Pine	

VINES

Vines are as essential in harmonizing the house with its surroundings as the trees and shrubs we plant about it. When used in this manner, their principal function is to tone down the stiff, bold angles and bare surfaces of the house, producing a softness in the landscape that could be obtained in no other way. They are also valuable in covering steep banks, walls, and fences, in the production of screens, and in the covering of stumps or conspicuous trunks of trees.

Success in their use depends upon selecting the proper places to plant the vines and upon choosing the most appropriate vine for each place. As one frequently sees them used, they are covering spaces which would be far more beautiful if left open or leaving spaces exposed which should be covered, thus ruining the architectural features of the building. If correctly used, they should embellish rather than conceal the architecture. Porch columns, cornice lines, corners and angles of buildings should be left open here and there to reveal the form and design of the structure. By planting the less sightly portions and leaving the more beautiful elements of the design exposed, even the most ordinary looking houses may often become very attractive. The style of architecture of the building will largely determine the character of the vine that should be selected to embellish it. The Dutchman's Pipe and Boston Ivy are more suitable for the development of the formal style of treat-

ment than the freer growing vines such as the Clematis and Honeysuckle. Some of the flowering vines that do not produce a dense shade are particularly valuable for draping porch columns and training about windows or along the cornice of a porch. The flowering Clematis, Wisteria and Honeysuckle may often be used in this way, while on porches with a western exposure where a dense shade is desirable, the Virginia Creeper, Bittersweet or some of the vines producing a heavier foliage may be most desirable.

The planting of vines too closely to the foundation of buildings is a frequent cause of failure in their development, as the cold wall and dry soil in such a location are not conducive to the growth of vines. It is better to plant them a foot to eighteen inches from the wall where the soil is moist and the roots may develop vigorously. Exposure is also an important consideration in planting vines. Many of the vines such as Wisteria, Climbing Roses, and Clematis prefer a southeastern exposure while the Virginia Creeper, Dutchman's Pipe, and the Honeysuckles thrive in shady places with a northern exposure. Most vines, however, flower more freely if given plenty of sunlight. The soil is a very important factor in growing vines successfully. They require a well drained soil, fairly moist, and fertile, although they often survive and struggle along under adverse conditions. Poor soil should be replaced with rich loam if this can be obtained. Otherwise, it should be enriched with well decomposed stable manure or commercial fertilizer, being careful that this material is not allowed to come in direct contact with the roots. After planting, the soil should be kept well cultivated and never allowed to become hard and dry.

The dust and gases of the cities ruin many of the vines although certain kinds such as Boston Ivy and Virginia Creeper seem to thrive even under these conditions. These vines, however, should not be allowed to climb upon wooden structures as they are apt to make the house damp and to cause the wood to decay. Vines are very acceptable in planting steep banks and thus preventing washing, while by covering bare and unsightly places under trees or over dead stumps, they may be made to produce excellent landscape effects. For covering stone walls, fences, arbors, and in countless other ways, vines will be found most effective.

VINES FOR SPECIAL PURPOSES

a. Flowering Vines

<i>Clematis jackmani</i>	<i>Campsis radicans</i>
Jackman Clematis	Trumpet Creeper
<i>Clematis paniculata</i>	<i>Wisteria sinensis</i>
Sweet Autumn Clematis	Chinese Wisteria
<i>Lonicera japonica halliana</i>	
Hall Japan Honeysuckle	

b. Vines for Covering Brick, Stone, Masonry

<i>Ampelopsis tricuspidata veitchii</i>	<i>Euonymus radicans vegetus</i>
Boston Ivy	Bigleaf Wintercreeper
<i>Ampelopsis quinquefolia engelmanni</i>	
Engelmann Creeper	

c. Vigorous Climbing Vines with Heavy Foliage

Celastrus scandens
American Bittersweet

Campsis radicans
Trumpet Creeper

Ampelopsis quinquefolia
Virginia Creeper

Clematis paniculata
Sweet Autumn Clematis

Lonicera (In variety)
Honeysuckle

Wisteria sinensis
Chinese Wisteria

Aristolchia macrophylla
Dutchmans-pipe

d. Hardy Climbing Roses

American Pillar (Crimson Rose)
Climbing American Beauty (Car-
mine)

Dorothy Perkins (Pink)

Evangeline (Light Pink)

Excelsa (Scarlet-crimson)

Hiawatha (Crimson)

Mary Lovette (White)

Paul's Scarlet Climber (Crimson)

Star of Persia (Yellow-Pillar rose)

Tausendschon (Pink)

White Dorothy (White)

HARDY PERENNIALS

Hardy perennials will always remain a most popular class of flowering plants. There is not a time during the whole flower season in which some hardy perennial is not in bloom, while during July and August, when almost all the woody shrubs have ceased blooming, these plants are mainly depended upon for flower display. They are not fastidious about the soil they grow in although many have a preference. For planting under trees or shrubberies, on sloping dry banks, or along the borders of ponds or brooks suitable perennials may be selected which thrive under such conditions. Their ability to thrive with little care makes them a very suitable and desirable class of plants for the home grounds.

Perennials are especially suited for border planting and are most effective when placed in front of shrubbery masses. They are also used to advantage when planted along garden walks, walls, fences, against buildings, and in innumerable other places about the home grounds. Perennials should be planted in groups or naturalistically massed as the effect produced by a colony is more attractive than the effect of a number of varieties scattered aimlessly with few plants of each together.

Many of the perennials can be grown from seed. It is best to sow the seed in hotbeds or cold frames very early in the spring and



Fig. 27.—The Spike-Speedwell produces beautiful spikes of lustrous blue color.

the seeding may be afterwards transplanted out-of-doors. Usually, however, they are propagated more easily by division.

Of the old time favorites, there are the foxgloves, larkspurs, hollyhocks, sweet-williams, and phlox which are so characteristic of the early colonial gardens and which are just as desirable today. There are the columbines, blanket-flowers, coreopsis, peonies, and poppies, favorites for their beautiful flowering effects. For planting about ponds or upon deep moist soil, the iris, forget-me-nots, lily-of-the-valley, bee balm, trillium, cardinal flower, and the ornamental grasses are especially suitable, while for late summer and fall effects the hardy chrysanthemums, golden glow, asters, and anemone or wind flower are best. So, from early spring until fall when the ground is finally covered with a blanket of snow, the hardy perennials lend their flower color to brighten the landscape.



Fig. 28.—The Iris is one of the most ideal perennials for home plantings.

PERENNIALS FOR SPECIAL PURPOSES

a. Standard Types for General Planting

Iris germanica

German Iris

Phlox paniculata

Garden Phlox

Paeonia

Peony

Delphinium

Larkspur

Aster

Aster

Rudbeckia laciniata

Golden Glow

Coreopsis lanceolata

Lance-leaved Tickseed

Dianthus barbatus

Sweet William

Aquilegia

Columbine

Chrysanthemum

Chrysanthemum

Althaea rosea

Hollyhock

b. Perennials Which Should Be More Largely Used

<i>Achillea ptarmica</i> var. <i>Boule de Neige</i>	<i>Gaillardia aristata grandiflora</i>
Ball of Snow	Common Perennial Gaillardia
<i>Monarda didyma</i>	<i>Narcissus poeticus</i>
Oswego Beebalm	Poet's Narcissus
<i>Hosta plantaginea</i>	<i>Anemone japonica</i>
White Plantainlily	Japanese Anemone
<i>Gypsophila paniculata</i>	<i>Iberis sempervirens</i>
Babysbreath	Evergreen Candytuft
<i>Papaver orientale</i>	<i>Aquilegia formosa</i>
Oriental Poppy	Sitka Columbine
<i>Phlox subulata</i>	<i>Chrysanthemum coccineum</i>
Moss Phlox	Painted Lady
<i>Hibiscus moscheutos</i>	<i>Veronica spicata</i>
Common Rosemallow	Spike Speedwell
<i>Miscanthus sinensis</i>	
Eulalia	

Choice Varieties of Peonies

<i>Festive maxima</i> (Paper White)	<i>La France</i> (Soft Pink)
<i>Le Cygne</i> (Cream White)	<i>Mon. Jules Elie</i> (Pink)
<i>Solange</i> (White)	<i>Sarah Bernhardt</i> (Mauve-rose)
<i>Therese</i> (Violet-rose)	<i>Baroness Schroeder</i> (White)
<i>Lady A. Duff</i> (Shell Pink)	<i>Mme. Emile Lemoine</i> (White)
<i>Marie Crousse</i> (Lilac-rose)	<i>Milton Hill</i> (Flesh)



Fig. 29.—Plantings of hardy shrubs about the boundaries of the lawn with hardy perennials in front of them make very pleasing effects.

Choice Varieties of Phlox

Mrs. Jenkins (Late White)	Elizabeth Campbell (Salmon Pink)
Fraulein Von Lassburg (Midseason White)	Miss Lingard (Early White)
B. Comte (Purple)	Rijnstroom (Rose-pink)
Bridesmaid (White, Carmine Center)	Thor (Salmon-pink)

Choice Varieties of German Iris

Florentina (White tinged with blue, early)	Madame Pacquette (Bright Rosy Claret, early)
Gracchus (Yellow and Crimson, early)	Pallida Dalmatica (Lavender, Blue)
King of Iris (Yellow and Brown)	Silver King (Silvery White, early)
Madame Chereau (White tinged with Blue)	Her Majesty (Lilac Pink)
	Caprice (Rosy-red)
	Crusader (Lavender-blue)
	Isoline (Mauve-pink)



Fig. 30.—Hollyhocks should be planted against buildings, walls or in front of higher growing plantings.

ANNUALS

Annuals are always desirable on every home grounds as they are most essential in producing the best and most continuous display of flowers during the summer months. Their great variety and their adaptability to all soils and conditions as well as the many beautiful ways in which they may be used about the home grounds make them almost indispensable. As cut flowers, they are the particular favorites of nearly every one, and the planting of the home grounds without a few such annuals

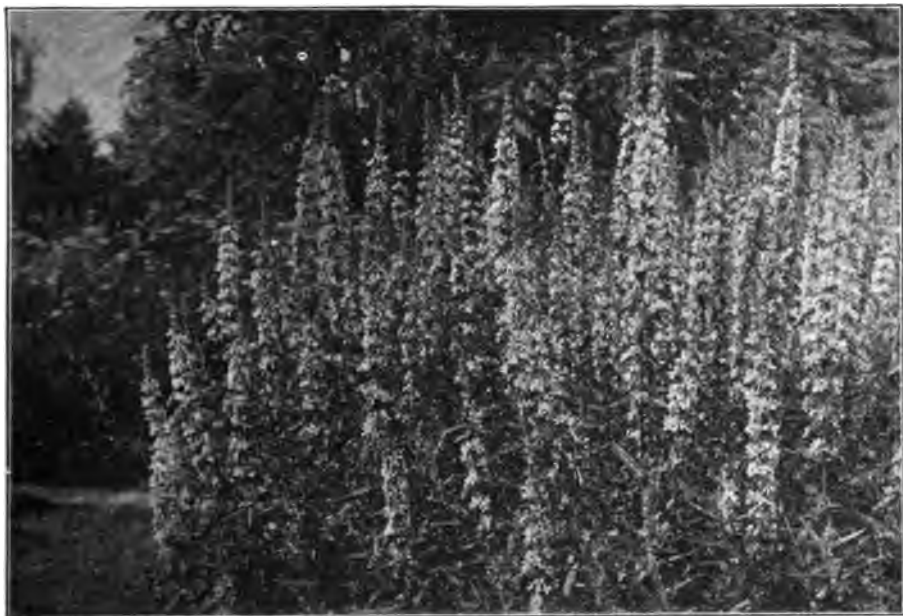


Fig. 31.—Purple Loosestrife is a late summer flowering perennial that delights in a moist soil.

as sweet peas, asters, pansies, or nasturtiums would hardly seem complete.

Annuals are also especially valuable in producing quick effects as well as for beautifying the grounds of the renter or person who has not the means to plant the more expensive perennial or permanent kinds. When planted in the foreground of shrubs or among perennials, annuals are most pleasing but it is an unfortunate mistake to grow annuals in flower beds dotted over the lawn. In the free and natural style of landscape gardening, they should be planted in naturalistic beds about the borders of the home grounds, and, when so arranged, they enhance the beauty of the entire grounds. They may also be appropriately placed as border plantings along garden walks, about the base of buildings, or in front of walls or fences.

Annuals are fortunately very easy to grow. Almost all of them may

be grown successfully by sowing the seeds of the plants directly in the permanent beds, but usually better plants are obtained by seeding them in hotbeds or cold frames or in boxes of earth in the house, from which they may later be transplanted to the beds. Frequently, the plants come into blossom a month earlier when grown in this manner and a longer flowering season is obtained.

The kinds of annuals are so numerous that a selection is largely a matter of personal preference. The pansies, if sown in July or August, produce an excellent early spring display, while, if seeded indoors in late winter and planted in a partially shaded location, they should bloom



Fig. 32.—The Goat's-beard, grown for its large showy panicles of white flowers, thrives in a rich moist soil in partly shaded locations.

continuously during the summer. The sweet alyssum, dusty-miller, candytuft, and lobelia make excellent edging plants; while, for summer flower displays, nasturtiums, petunias, coxcomb, stocks, verbenia, annual phlox, poppies, salvia, zinnias, and balsams are all easily grown and very effective. Portulaca is most accommodating in covering dry sandy banks and the heliotrope, marguerites, stocks, and mignonette in furnishing the gardens with their delightful fragrance. For large foliage effects there is nothing to compare with ricinus or castor oil bean, while the large beautiful colored flower spikes of the snapdragon compare very favorably with the beauty of any of the perennials. In late summer, the asters, cosmos and burning-bush add their brilliance to the flower display and nearly all of these annuals continue to bloom till frosts dismantle their robes of beauty.

Annuals Valuable for Cut Flowers

Asters, late branching	Bachelor Buttons
Sweet Peas	Zinnias
Cosmos, early flowering	Snapdragon
Pansies	Corn Flower
Nasturtiums, dwarf	Heliotrope
Mignonette	Stocks
Dianthus	



Fig. 33.—Cobea is one of the most rapid growing of the annual vines and hence is excellent for quick effects.

Annuals for Garden Effects*For edgings:*

Sweet Alyssum
 Lobelia
 English Daisy
 Dwarf Cockscomb
 Dusty Miller
 Ageratum
 Candytuft

For bedding effects:

Annual Phlox
 Verbena
 Annual Poppies
 Petunia, var. Rosy Morn
 African Daisy
 Marigold
 Balsam
 Celosia
 Portulaca

Tall growing annuals:

Castor Oil Bean
 Sunflower
 Cosmos, late

Annual Vines

Cyperus Vine
 Balloon Vine
 Gourd, Ornamental
 Climbing Nasturtiums
 Scarlet-runner Bean

Wild Cucumber
 Morning Glory
 Hop Vine
 Moon Vine
 Cobia



MICHIGAN AGRICULTURAL COLLEGE

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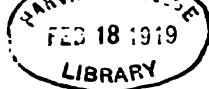
CHEMICAL SECTION

COMMERCIAL FEEDING STUFFS

BY

**ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER, T. E. FRIEDMANN
AND P. O'MEARA**

**EAST LANSING, MICHIGAN
1918**



The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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*Absent on leave for war service.

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. B. W. Householder, Supt.
Grayling, Crawford County, 80 acres deeded.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.

COMMERCIAL FEEDING STUFFS

ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER, T. E. FRIEDEMANN

• AND P. O'MEARA.

The present feeding stuffs law (Act 91, P. A. 1917) became operative April 1, 1918. As the full text of the act was printed in Bulletin No. 279 only the main provisions will be discussed. Copies of the law will be furnished upon request.

Label. Every lot or parcel of "commercial feeding stuffs" shall bear on the bags or tags attached thereto a statement certifying, 1st, the net weight of the contents of the package, lot, or parcel; 2nd, the name, brand or trademark; 3rd, the name and principal address of the manufacturer or person responsible for placing the commodity on the market; 4th, the minimum percentage of crude portein, the minimum percentage of crude fat and the maximum percentage of crude fibre; 5th, the specific name of each ingredient used in its manufacture.

Registration. All "commercial feeding stuffs" within the meaning of the act must be registered annually. To make the fiscal year concurrent with the calendar year the present license period was made to terminate December 31, 1918, with a fee of \$15.00 for each brand registered. After this date the registrations must be made on or before January 1st each year or before the feed is placed on sale and the license fee will be \$20.00 per brand as in previous years.

Samples not required. The forwarding of samples at the time of applying for license is not necessary except when requested by the administrative officer.

Registrations may be refused or cancelled. The administrative officer may refuse to license a brand if the name appears to be deceptive or misleading. He also has power to cancel a license if it appears, at any time, that any of the provisions of the law have been violated.

Materials exempt from license fee. Unmixed whole seeds and grains; unmixed meals made directly from the entire grains of corn, wheat, rye, barley, oats, buckwheat, flaxseed, kafir and milo; corn and oats feed made by grinding together the pure grains of corn and oats; wheat, rye and buckwheat brans or middlings when unmixed with other materials; whole hays, straws, egsilage and corn stover when unmixed with other materials and all materials containing 60 per cent or more of water.

The definitions adopted by the Association of Feed Control Officials will be considered official in Michigan, and it is expected that the manufacturers will adhere to them as closely as possible.

RULES.

The following rules were passed by the State Board of Agriculture at a meeting held March 20, 1918, in East Lansing, Michigan:

RULE No. 1. "*Wheat Bran* with Screenings not exceeding Mill Run" is interpreted as meaning bran to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the bran. The Screenings may or may not be reduced.

RULE No. 2. "*Wheat Middlings* with Screenings not exceeding Mill Run" is interpreted as meaning middlings to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the middlings. The screenings may or may not be reduced.

RULE No. 3. "*Wheat Bran* and *Wheat Middlings* when labelled as containing "Screenings not exceeding Mill Run" are considered to be "Commercial Feeding Stuffs" within the meaning of the law and subject to license. This rule shall take effect April 1st, 1918.

RULE No. 4. "*Statement of Guaranteed Analysis*. Section 2 of the Feeding Stuffs law is interpreted to mean that only the minimum guarantees for Protein and Fat and the maximum guarantee for Crude Fiber may be stated on the labels. The sliding guarantee is prohibited. This rule shall take effect April 1st, 1918."

POINTS OF INTEREST TO DEALERS.

Represent only Reliable Firms and before purchasing feed for resale in Michigan, find out if the particular feed has been properly licensed by the manufacturer, broker, or party responsible for its shipment into the State. The State law has no jurisdiction over parties residing outside of the State and the only way they can be reached is through the U. S. Department of Agriculture for a violation of the Federal Food and Drugs Act. Failure to license a feed in Michigan would not be a violation of the Federal law and if properly tagged, shipment into the State cannot be prevented. The Michigan law becomes operative only when such feed is offered for sale within the State. Ignorance of the provisions of the law is not sufficient grounds for defense. When the inspectors find an unlicensed feed being offered for sale the dealer is given written notice and requested to discontinue the sale until the person or concern responsible for shipping the product into the State has complied with the requirements of the law. Dealers who continue to sell unlicensed feeds after due notice has been given will be held responsible and evidence of the violation of the feeding stuffs law will be submitted to the Prosecuting Attorney in the county wherein the violation occurs.

Frequently it occurs that carload shipments reach their destination untagged. In such cases the dealer should telephone or telegraph the manufacturer or jobber immediately for proper tags and insist upon getting them at once as the sale of untagged feeds is not permissible under any circumstances. Tags sent forward by mail or placed in a carload of feed but not attached to the bags should be put on as the car is unloaded. Some responsible person should give the matter of proper tagging careful attention rather than trust it to some irresponsible laborer.

Retain Freight Bills. The State inspectors of feeding stuffs are also federal inspectors and authorized to take samples of shipments made in violation of the Federal Food and Drugs Act. In order to establish evidence of interstate shipment it is necessary to secure copies of the freight bill, bill of lading and bill of sale covering a shipment. Dealers should, therefore, keep on file all the documents and papers relating in any way to all interstate shipments of feed stuffs.

POINTS OF INTEREST TO PURCHASERS.

Consult the annual bulletin and find out what companies are most consistently meeting their guarantees.

Do not buy a feed simply because it is cheap without comparing the guaranteed analysis with that of other feeds that may be available and also examine it carefully to determine, if possible, the ingredients of which it is composed. In these times of high prices, one should consider these points carefully.

Do not send samples for analysis without first writing for instructions on how to secure a representative sample. A sample from one bag or a small handful taken from the top of several bags is not representative and an analysis of such a sample would be of no value. The cost of making an analysis is considerable and we cannot take the time to analyze samples that are not representative of the lot from which they were taken. Our inspectors are continually collecting samples of feeding stuffs and in many cases we can furnish information concerning a particular brand of feed without making another analysis.

When purchasing feed in car lots, an inspector will be sent to draw samples if the office of the chemist in charge is notified upon arrival of the car.

Do not accept feed in untagged or unlabeled bags except such feeds as are exempt from license as heretofore mentioned. An untagged package gives the purchaser no guarantee as to analysis or ingredients and furthermore the product is sold in violation of the feeding stuffs law. Such cases should be brought to the attention of the office of the chemist.

If buying bulk feeds subject to license demand of the seller a printed guarantee giving the analysis and ingredients—the law provides that the purchaser shall have it.

COOPERATION WITH U. S. DEPARTMENT OF AGRICULTURE.

Through a plan of cooperation devised by the U. S. Department of Agriculture the State inspectors are empowered to collect samples from interstate shipment of feed stuffs found in Michigan under the Food

& Drugs Act. In this cooperative work twenty-four cases were referred to the laboratory of the central inspection district in Chicago; eighteen of the samples were collected on account of deficiencies in protein, four were untagged shipments and two were taken at the suggestion of the Chief Inspector of the central inspection district.

REBATES.

The State law does not provide for the payment of rebates on feeds found deficient in some respect but such cases are often referred to this Department. Settlement is advised on the basis of the combined protein and fat. The following example is taken from the present year's records.

Guaranteed		Found		Price per		Rebate per
Protein	Fat	Protein	Fat	ton		ton
(41 + 6)	—	(38 + 6.2)				
<hr/>				X \$54.00	=	\$3.21
Guaranteed						
Protein Fat						
(41 + 6)						

As the records of the distribution of rebates made during the year are not complete at this time no tabulation is made.

DEFINITIONS.

The following definitions of Feeding Stuffs and by-products used for feeding purposes have been adopted by the Association of Feed Control Officials of the United States at their several meetings, and, in the interest of uniformity, it is urged that all manufacturers and millers adhere to them as closely as possible in labeling the feeds intended for sale in Michigan.

Meal is the clean, sound, ground product of the entire grain, cereal or seed which it purports to represent.

Chop is a ground or chopped feed composed of one or more different cereals or by-products thereof. If it bears a name descriptive of the kind of cereals, it must be made exclusively of the entire grains of those cereals.

Screenings are the smaller imperfect grains, weed seeds and other foreign material having feeding value, separated in cleaning the grain.

Alfalfa Meal is the entire alfalfa hay ground, and does not contain an admixture of ground alfalfa straw or other foreign materials.

ANIMAL PRODUCTS.

Blood Meal is ground dried blood.

Cracklings are the residue after partially extracting the fats and oils from the animal tissue. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

Digester Tankage is the residue from animal tissue exclusive of hoof and horn, specially prepared for feeding purposes by tanking under live

steam, drying under high heat, and suitable grinding. If it contains more than 10 per cent of phosphoric acid (P_2O_5), it must be designated **Digester Meat and Bone Tankage**.

Meat Scrap and Meat Meal are the ground residues from animal tissue exclusive of hoof and horn. If they contain more than 10 per cent of phosphoric acid (P_2O_5), they must be designated **Meat and Bone Scrap**, and **Meat and Bone Meal**. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

BREWERS' AND DISTILLERS' PRODUCTS.

Brewers' Dried Grains are the properly dried residue from cereals obtained in the manufacture of beer.

Distillers' Dried Grains are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

Malt Sprouts are the sprouts of the barley grain. If the sprouts are derived from any other malted cereal, the source must be designated.

BUCKWHEAT PRODUCTS.

Buckwheat Shorts or Buckwheat Middlings are that portion of the buckwheat grain immediately inside of the hull after separation from the flour.

CORN PRODUCTS.

Corn Bran is the outer coating of the corn kernel.

Corn Germ Meal is a product in the manufacture of starch, glucose and other corn products and is the germ layer from which a part of the corn oil has been extracted.

Grits are the hard, flinty portions of Indian corn, without hulls and germ.

Corn Gluten Meal is that part of commercial shelled corn that remains after the separation of the larger part of the starch, the germ and the bran, by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Corn Gluten Feed is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germ by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

OIL CAKE.

Oil Cake is the residual cake obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product, the name of the seed from which it is obtained shall be prefixed to "oil cake."

Ground Oil Cake is the product obtained by grinding oil cake. When

used alone, the term "ground oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "ground oil cake."

COTTONSEED PRODUCTS.

Cottonseed Meal is a product of the cottonseed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 36 per cent of protein.

Choice Cottonseed Meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint and must contain at least 41 per cent of protein.

Prime Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent of protein.

Good Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

Cottonseed Feed is a mixture of cottonseed meal and cottonseed hulls containing less than 36 per cent of protein.

Cold Pressed Cottonseed is the product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire cottonseed less the oil extracted.

Ground Cold Pressed Cottonseed is the ground product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire ground cottonseed less the oil extracted.

LINSEED AND FLAX PRODUCTS.

Flax Plant By-Product is that portion of the flax plant remaining after the separation of the seed, the bast fiber and a portion of the shives, and consists of flax shives, flax pods, broken and immature flax seeds and the cortical tissue of the stem.

Unscreened Flaxseed Oil Feed is the ground product obtained after extraction of part of the oil from unscreened flaxseed by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents. When sold without grinding the unground product shall be designated as "unscreened flaxseed oil feed cake."

Ingredients of Unscreened Flaxseed Oil Feed—Ground cake from partially extracted flaxseed and foreign seeds (wheat, wild buckwheat, pigeon grass, wild mustard, etc.)

Screenings Oil Feed is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from the smaller imperfect grains, weed seeds and other foreign materials having feeding value separated in cleaning the grain. The name of the grain from which the screenings are separated shall be prefixed to "screenings oil feed."

OAT PRODUCTS.

Oat Groats are the kernels of the oat berry.

Oat Hulls are the outer chaffy coverings of the oat grain.

Oat Middlings are the floury portion of the oat groat obtained in the milling of rolled oats.

Oat Shorts are the covering of the oat grain lying immediately inside the hull, being a fuzzy material carrying with it considerable portions of the fine floury part of the groat obtained in the milling of rolled oats.

Clipped Oat By-Product is the resultant by-product obtained in the manufacture of clipped oats. It may contain light, chaffy material broken from the ends of the hulls, empty hulls, light, immature oats and dust. It must not contain an excessive amount of oat hulls.

PEANUT PRODUCTS.

Peanut Oil Cake is the residue after the extraction of part of the oil by pressure or solvents from peanut kernels.

Peanut Oil Meal is the ground residue after the extraction of part of the oil from peanut kernels.

Unhulled Peanut Oil Feed is the ground residue obtained after extraction of part of the oil from whole peanuts, and the ingredients shall be designated as "peanut meal and hulls."

RICE PRODUCTS.

Rice Bran is the cuticle beneath the hull.

Rice Hulls are the outer chaffy coverings of the rice grain.

Rice Polish is the finely powdered material obtained in polishing the kernel.

WHEAT PRODUCTS.

Wheat Bran is the coarse outer coatings of the wheat berry obtained in the usual commercial milling process from wheat that has been cleaned and scoured.

Shorts or Standard Middlings are the fine particles of the outer and inner bran separated from bran and white middlings.

Wheat White Middlings or *White Middlings* are that part of the offal of wheat intermediate between shorts or standard middlings and red dog.

Shipstuff or *Wheat Mixed Feed* is a mixture of the products other than the flour obtained from the milling of the wheat berry.

Red Dog is a low grade wheat flour containing the finer particles of bran.

Wheat Bran with Mill Run Screenings is pure wheat bran plus the screenings which were separated from the wheat used in preparing said bran.

Wheat Bran with Screenings not Exceeding Mill Run is either wheat bran with the whole mill run of screenings or wheat bran with a portion of the mill run of screenings, provided that such portion is not an inferior portion thereof.

MISCELLANEOUS PRODUCTS.

Yeast or Vinegar Dried Grains are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar and consists of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugars, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast.

Palm Kernel Oil Meal is the ground residue from the extraction of part of the oil by pressure or solvents from the kernel of the fruit of the *Elaeis guineensis* of *Elaeis malanococca*.

Ivory Nut Meal is ground ivory nuts.

TENTATIVE DEFINITIONS.

Corn Feed Meal is the by-product obtained in the manufacture of cracked corn, with or without aspiration products added to the siftings, and is the by-product obtained in the manufacture of table meal from the whole grain by the non-degerminating process.

Hominy Feed, Hominy Meal or Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the white corn kernel obtained in the manufacture of hominy, hominy grits and corn meal by the degerminating process.

Yellow Hominy Feed, Yellow Hominy Meal or Yellow Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the yellow corn kernel obtained in the manufacture of yellow hominy grits and yellow corn meal by the degerminating process.

Linseed Meal is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes, provided that the final product shall not contain over 6 per cent of weed seeds and other foreign materials and provided further that no portion of the stated 6 per cent of weed seeds and other foreign materials shall be deliberately added.

Oil Meal is the ground product obtained after the extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from seeds which have been screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Oil Meal" shall be understood to designate linseed meal as defined. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to the words "oil meal."

Old Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds

screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Old Process Oil Meal" shall be understood to designate linseed meal as defined, made by the old process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "old process oil meal."

New Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, heating and the use of solvents from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone "New Process Oil Meal" shall be understood to designate linseed meal as defined, made by the new process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "new process oil meal."

Ground Flaxseed or Flaxseed Meal is the product obtained by grinding flaxseed which has been screened and cleaned of weed seeds and other foreign material by the most improved commercial processes, provided that the final product shall not contain over 4 per cent of weed seeds and other foreign materials, and provided further that no portion of the stated 4 per cent of weed seeds and other foreign materials shall be deliberately added.

PROPOSED DEFINITIONS.

Wheat Bran consists of the coarse outer coatings of the kernel obtained in the usual commercial process of milling from wheat that has been cleaned and scoured.

Wheat Shorts or Middlings.

(a) Brown (Red) Shorts consist mostly of the fine particles of bran and germ and contains very little of fibrous offal obtained from the "tail of the mill."

(b) Standard (Total or Gray) Shorts consist of the fine particles of the outer bran, the inner or "Bee-wing" bran, germ, and the offal, or fibrous material, obtained in the last reduction on millings.

(c) White Shorts consist of a smaller portion of the fine bran particles and germ and a much greater portion of the fibrous offal from the "tail of the mill."

Red Dog consists of a mixture of low-grade flour, fine particles of bran and the fibrous offal from the "tail of the mill."

Ship Stuff (Wheat Mixed Feed) consists of pure wheat bran and standard, or total, shorts combined in the proportions obtained in the usual process of commercial milling.

(Note—If to any of the foregoing brands of feed there should be added screenings, or scourings, as hereinafter defined, either ground or unground, bolted or unbolted, such brand shall be so registered, labeled and sold as clearly to indicate this fact. The word "Screenings" or "Scourings" as the case may be, shall appear as a part of the name or brand and shall be printed in the same size and face of type as the remainder of the brand name.)

Screenings consist of the smaller, imperfect grains, weed seeds, and

other foreign materials, having feed value, separated in cleaning the grain.

Scourings consist of such portions of the cuticle, brush, white caps, dust smut, and other materials as are separated from the grain in the usual commercial process of scouring.

DISCUSSIONS OF RESULTS.

During the past year 919 samples of feed have been analyzed. Of this number 13 represented products which are not subject to license and 10 samples represented shipments which the manufacturers refused to license. In the future all unlicensed "commercial feeding stuffs" will be removed from sale wherever found. Dealers are, therefore, cautioned about handling such feed.

In summarizing the results of the inspection during the past year, we find that 75 or 8.3 per cent of the samples were below guarantee in protein, 68 or 7.5 per cent were below guarantee in fat and 117 or 12.8 per cent were above guarantee in crude fiber. This is an improvement over the results obtained last year and nearly 50 per cent better than the results of 1916. The greatest improvement is noticed in the cottonseed meals. During the first year (1916) 51 per cent of the cottonseed meals examined were found below guarantee in protein. During the past year only 17 per cent of the cottonseed meal samples were deficient in protein. This is due, not so much to an improvement in the quality of the meal as to a more truthful statement of the guarantees. In other words, the cottonseed sold in Michigan during the past year has been no better than that of other years but the guarantees have been adjusted to fit the facts.

There has been a decided falling off in the number of samples of distillers and brewers grains shipped into the State. This is evidently due, in part, to a partial boycott on the part of distillers and brewers against shipping their products into dry states.

The highest percentage of deficiencies was found in the calf meals, hog meals and molasses feeds. In buying these classes of feeds the purchaser takes greater chances of not getting the value guaranteed than in any of the other classes of feed.

There has been a notable decrease in the number of samples of wheat bran and middlings on the market. These have been replaced in part by rye and barley feeds and other less common products.

A complete summary of the results obtained during the past three years is given in the following table. The figures here presented clearly show the effect of a vigorous inspection service in improving the whole feed situation throughout the State.

Feeds.	Number of samples.			Deficient in protein or fat.						Deficient in protein.						Deficient in fat.						Excess of fibre.								
	1916.		1917.	1918.		1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.		
	No.	%		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
	1916.	1917.	1918.																											
Cottonseed Meal	144	93	106	78	53.0	34	38.6	18	17.0	76	51.0	32	34.4	18	17.0	9	6.2	7	7.5	0	0.0	37	39.6	45	48.4	23	21.7	0	0.0	
Cottonseed Feed	1	1	8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	
Lined Meal	46	52	53	2	4.3	0	0.0	5	9.4	2	4.3	0	0.0	5	9.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.9	
Distillers Grains, Corn	17	10	4	5	29.4	4	40.0	0	0.0	2	29.4	2	20.0	0	0.0	5	29.4	3	30.0	0	0.0	1	5.9	0	0.0	1	25.0	0	0.0	
Distillers Grains, Rye	2	5	2	2	100.0	5	100.0	.....	.....	2	100.0	3	60.0	.....	.....	2	100.0	5	100.0	.....	.....	1	50.0	3	60.0	.....	.....	.....	.....
Brewers Grains	8	10	1	1	12.5	2	20.0	1	100.0	0	0.0	2	20.0	0	0.0	1	12.5	2	20.0	1	100.0	1	12.5	1	10.0	1	100.0	0	0.0	
Yeast & Vinegar grains	13	15	13	4	30.8	1	6.7	4	30.8	2	15.4	1	5.9	2	15.4	3	12.6	1	5.9	1	6.7	4	42.0	0	0.0	1	7.7	0	0.0	
Corn Gluten Feed	24	17	15	4	16.7	2	11.8	1	6.7	0	0.0	1	5.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Corn Gluten Meal	3	3	1	1	33.3	0	0.0	0	0.0	2	20.0	0	0.0	0	0.0	0	0.0	4	40.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Hominy Feed	10	5	7	4	40.0	0	0.0	1	14.3	2	20.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Corn Oil Cake Meal	8	11	8	5	31.3	3	27.3	3	37.5	4	25.0	0	0.0	2	25.0	.....	.....	.....	.....	.....	.....	1	12.5	0	0.0	0	0.0	0	0.0
Corn Feed Meal	16	11	10	4	25.0	3	27.3	4	25.0	2	12.5	4	13.8	1	3.7	4	25.0	3	27.3	4	25.0	0	0.0	0	0.0	4	14.8	1	6.7	
Animal By-Products	16	29	27	10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	6.7	4	13.8	0	0.0		
Alfalfa Meal	9	7	10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	10.0	0	0.0	0	0.0	2	22.2	0	0.0	0	0.0	0	0.0	
Calf Meal	21	23	19	7	33.3	11	47.8	9	47.4	4	19.0	7	30.4	5	26.3	2	9.5	6	26.1	6	31.6	2	9.5	4	17.4	5	26.3	0	0.0	
Hop Meal	12	10	21	6	50.0	7	70.0	5	23.8	0	0.0	3	30.0	3	14.3	6	50.0	5	50.0	4	19.4	1	8.3	5	50.0	6	28.6	8	15.9	
Dairy & Stock Feeds	99	89	113	19	19.2	20	22.5	28	24.8	13	13.1	14	15.7	8	7.1	10	10.1	5	5.6	23	20.3	12	12.1	33	37.1	18	15.9	18	15.9	
Molasses Dairy and	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stock Feeds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horse Feeds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Molasses Horse Feeds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poultry Feeds	212	207	192	21	9.9	13	6.3	14	7.3	8	3.8	6	2.9	13	6.8	19	9.0	8	3.9	4	2.8	4	1.9	6	2.9	6	3.1	6	3.1	
Corn & Oat Feeds	31	11	14	58.3	10	32.3	2	8.3	3	8.3	6	19.4	0	0.0	0	0.0	13	54.2	9	29.0	0	0.0	0	0.0	2	18.1	2	18.1	2	18.1
Wheat Bran	111	39	40	25	22.6	0	0.0	1	2.0	24	21.6	0	0.0	1	2.1	10	9.2	0	0.0	1	2.0	2	1.8	0	0.0	2	4.1	0	0.0	
Wheat Middlings	109	42	48	17	15.6	0	0.0	3	6.2	10	9.2	0	0.0	0	0.0	1	2.1	10	9.2	0	0.0	2	1.8	0	0.0	1	2.1	0	0.0	
Wheat Mixed Feeds	11	6	5	6	54.5	0	0.0	0	0.0	2	18.8	0	0.0	0	0.0	5	45.5	0	0.0	0	0.0	4	36.4	0	0.0	0	0.0	0	0.0	
Wheat & Rye Mixed Feeds	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rye Feeds	2	6	5	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	20.0	0	0.0	
Barley Feed	3	2	5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Cereal Food By-Products	25	9	13	5	20.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	20.0	0	0.0	0	0.0	1	4.0	0	0.0	3	23.1	0	0.0	

*Number of Molasses Feeds included in Dairy and Horse Feeds.

NEW FEEDS.

The demand for wheat flour substitutes has brought upon the market in abundance several feeds which heretofore were found but infrequently and only in small lots. Until recently these by-product feeds were usually worked up in ready mixed feeds, now, however, they are on sale as separate and distinct articles of feed. The more important of these are, barley feed, corn feed meal, oat meal mill by-products (oat hulls, oat shorts and oat middlings) and clipped oat by product.

Barley feed is the by-product from the manufacture of pearl barley and barley flour and consists of the coarse hull and fibrous material surrounding the starchy kernel with some adhering fine particles thereof. This feed is light and bulky, having a high fiber content. The average of samples analyzed during the year follows: moisture, 9.0%; protein 9.2%; fat, 2.5% and crude fiber, 20.2%. On account of the bulkiness and fibrous quality of this feed it is not successfully fed alone but it does make a valuable addition to mixtures of heavy and compact feeds such as corn feed meal, cottonseed meal and other concentrates of similar character.

The origin and character of the various oat by-products is covered on a previous page under "definitions." The variation in feeding value of these products is wide and hence each lot should be bought only upon the basis of the guaranteed analysis. The fiber content of the oat products sold separately or mixed is an indication of the quality of any particular lot in question, the fiber content of the middlings being 4.6% while that of the hulls is 29.2%:—in other words, a high percentage of fiber indicates a large proportion of hulls and a correspondingly low feeding value. These feeds have a value similar to barley feed as regards making the grain ration more bulky.

Corn feed meal is a by-product obtained in the manufacture of cracked corn, table meal and corn flour. In feeding value, it is nearly if not quite equal to the entire grain and at times can be purchased for less per ton. In mixing rations for cows and horses, corn feed meal can be used in place of the whole corn meal with little depression of the food value. For feeding pigs the meal should be moistened as otherwise it will be rooted out of the troughs and wasted.

Corn bran is also derived from the manufacture of table meal and cracked corn and consists of the transparent outer layer of the kernel with particles of the starchy portion adhering; frequently light shrunken kernels and other chaffy materials are present. This product contains from 9 to 12% crude protein, 6 to 8% fat and approximately 10% fiber. Henry and Morrison give the total digestible nutrients as 73.1 pounds per 100 pounds of the feed. The light, flaky character of corn bran, gives it especial value for mixing with heavy, compact concentrates. Some manufacturers grind the bran while others put it on the market as it comes from the mill.

The extensive use of corn oil for cooking purposes has brought corn oil cake meal on the market in appreciable quantities. It is a valuable feed for dairy cows and is also in high favor with many hog growers. This feed is usually prepared for pigs by soaking a few hours and is frequently mixed with middlings, which have about the same food value, at the time of feeding.

At several points in the State feeders have used velvet bean feed during the past winter with good results. The pods and seeds of the velvet bean are ground together without threshing, the product analyzing approximately 12.3% moisture, 17.1% protein, 4.6% fat and 14.3% fiber. In trials made by the Department of Animal Husbandry of the college it was found that the material was not palatable to swine and also contained too much fiber for these animals. Although meal made by grinding the seed alone gave somewhat better success it is used to best advantage as a hog feed only after cooking. Sheep ate the unground pods and seeds with relish and lamb feeders are getting good results by mixing the ground feed with shelled corn. When feeding this material to cattle it should be borne in mind that beans of any sort are not greatly relished and care should be taken not to include too great a proportion of the velvet bean feed in the grain ration. A small amount should be fed at first, increasing the proportion as the animals become more accustomed to it. Results obtained in the use of this feed in dairy rations as well as a corn supplement in rations for fattening steers are very favorable and indicate that it is worthy the attention of Michigan feeders.

A mixture of the bran and middlings obtained in the milling of rye for flour is sold as rye feed; this has about the same feeding value as the corresponding wheat mixed feed. There is greater danger of causing digestive disturbances in feeding rye products alone than with wheat products but limited amounts used in mixtures give good results. The cost to the feeder is usually somewhat lower than the cost of wheat feeds although the feeding value is approximately the same.

As a suggestion to the reader a few concentrated rations for dairy cows, using the feeds mentioned above, are given. These mixtures are in combinations to balance a roughage ration of clover hay and corn ensilage fed at the rate of 1 pound hay and 3 pounds ensilage per 100 pounds live weight with 1 pound of concentrates per day for each 3 pounds or 4 pounds of milk given per day. In these mixtures as outlined certain substitutions can be made without greatly changing the nutritive ratio:—bran may be substituted for barley feed, hominy feed for corn feed meal, standard middlings for velvet bean feed meal, and corn oil cake meal for standard middlings and velvet bean feed meal by putting in a few pounds less than is indicated for the latter feeds mentioned. Rye middlings, rye bran or rye feed may be substituted for the corresponding wheat feeds.

1.

Barley feed.....	100 lbs.
Cottonseed Meal.....	50 lbs.
Corn Feed Meal.....	100 lbs.
Wheat Bran.....	100 lbs.

3.

Barley Feed.....	100 lbs.
Gluten Feed.....	100 lbs.
Corn Feed Meal.....	100 lbs.
Cottonseed Meal.....	50 lbs.

2.

Barley Feed.....	150 lbs.
Corn Feed Meal.....	100 lbs.
Cottonseed Meal.....	50 lbs.
Oil Meal.....	50 lbs.

4.

Velvet Bean Feed.....	100 lbs.
Wheat Bran.....	100 lbs.
Corn Feed Meal.....	200 lbs.
Cottonseed Meal.....	50 lbs.
Gluten Feed.....	50 lbs.

5.	Velvet Bean Feed.....	100 lbs.
	Standard Wheat Mid-	
	dlings.....	100 lbs.
	Barley Feed.....	100 lbs.
	Hominy Feed.....	100 lbs.
	Cottonseed Meal.....	50 lbs.

6.	Velvet Bean Feed.....	100 lbs.
	Ground Corn.....	100 lbs.
	Ground Oats.....	100 lbs.
	Cottonseed Meal.....	50 lbs.

KEYSTONE STOCK CONDITIONER.

Since the last bulletin was issued, Keystone Stock Conditioner, mentioned therein has again been shipped into the State at a few points by the manufacturers, The Guaranty Food Co., Lewisburg, Pa. The analysis of this mixture reported last year gave the composition as largely cocoa shells and epsom salts; since that time sulphur, copperas, foenugreek, ginger, gentian, and capsicum have been added but in such very small quantities that its conditioning value is practically unchanged. As noted in the previous bulletin no food value is claimed for this product and hence no action can be taken under the State feeding stuffs law.

CONDIMENTAL FEEDS.

Regarding condimental feeds as a whole it is very true that they combine low quality and high prices to an unusual degree. For the purpose of comparison, the cost of a tonic with linseed meal as a filler was computed, using retail drug prices, the cost was found to be 7 cents per pound. By replacing the linseed meal with cocoa shells the cost could be lowered to 5.7 cents per pound. The prices charged for stock "foods" range from 10 to 25 cents per pound. That purchasers pay the manufacturer a handsome profit is very evident.

The large majority of properly conducted experiments fail to show profitable results from the use of these preparations. The results sometimes obtained are more often due to the liberal feeding and good care advocated in the accompanying directions than to any value in the "food." Henry & Morrison in *Feeds & Feeding* say on this point, "Rather than purchase advice with costly condimental foods the wise feeder will secure it in standard agricultural papers and books or from the experiment stations and the United States Department of Agriculture. Farm animals managed with reasonable care have appetites which do not need stimulating. Sick animals or those out of condition should receive specific treatment rather than be given some cure-all."

To cover the infrequent cases where "tonics" or "spices" are needed to sharpen the appetite especially, the following formulae are suggested by the authors quoted above:

No. 1.

Fenugreek.....	2 lbs.
Allspice.....	2 lbs.
Gentian.....	4 lbs.
Salt	5 lbs.
Salt Peter.....	5 lbs.
Epsom Salts.....	10 lbs.
Linseed Meal.....	100 lbs.

No. 2.

Ground Gentian.....	4 lbs.
Powdered Saltpeter.....	1 lb.
Ground Ginger.....	1 lb.
Powdered Copperas....	1 lb.

Formula No. 1, given a tablespoon with each feed, will supply more drugs than most of the much advertised stock feeds or tonics. Formula No. 2 may be given at the rate of one tablespoonful daily mixed with the feed for ten days, then omitted for three days and then given for ten days more. No drugs or tonics should be given healthy animals.

As a general tonic to be used when the appetite is not seriously impaired and when one desires to build up the general condition of the animal, the veterinary department of the College suggests the following as suitable for all kinds of livestock:

Sodium Sulfate (dried).....	5 oz.
Sodium Bicarbonate.....	4½ oz.
Sodium Chloride.....	2 oz.
Potassium Sulfate.....	2 drams.

Mix and feed with grain in tablespoonful doses to horses and cattle and teaspoonful doses to pigs and sheep two or three times daily until condition improves. With this an occasional dose of saltpeter in the drinking water—a teaspoonful to a pailful—will work advantageously if fattening is especially desired.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
COTTONSEED MEAL.							
American Cotton Oil Co., New York, N. Y.							
B 1934	Surety Brand Cottonseed Meal	Detroit	{ G. F. 8.7	36.0	5.5	14.0	\$33.00
B 2597	Surety Brand Cottonseed Meal	Holland	8.7	35.9	7.0	13.8	80.00
B 2671	Surety Brand Cottonseed Meal	Jamestown	9.1	39.0	6.4	12.7	54.00
B 2678	Surety Brand Cottonseed Meal	Bangor	8.2	35.9	7.4	6.8	60.00
B 2703	Surety Brand Cottonseed Meal	Adrian	8.4	36.2	7.4	12.1	83.50
B 2807	Surety Brand Cottonseed Meal	Dundee	8.5	36.5	7.2	12.2	58.00
B 2809	Surety Brand Cottonseed Meal	Milan	8.0	36.8	6.8	12.2	56.00
B 2817	Surety Brand Cottonseed Meal	Care	8.5	36.3	6.7	13.5	2 73
B 2818	Surety Brand Cottonseed Meal	Pigeon	8.8	34.8	6.7	13.2	52.00
B 2849	Surety Brand Cottonseed Meal	Sandusky	9.0	36.9	6.7	14.0	3.30
B 2882	Surety Brand Cottonseed Meal	Adrian	8.8	35.3	6.3	13.4	58.00
B 2976	Surety Brand Cottonseed Meal	Clio	9.9	38.0	6.4	13.6	60.00
B 3013	Surety Brand Cottonseed Meal	Alma	8.5	35.5	7.3	13.3	58.00
B 3051	Surety Brand Cottonseed Meal	Grand Rapids	8.5	32.9	6.4	14.1	54.00
B 3058	Surety Brand Cottonseed Meal	Grand Rapids	8.3	36.1	7.5	11.1	60.00
B 3074	Surety Brand Cottonseed Meal	Grand Rapids	8.4	37.6	6.2	15.4	2 73
B 3204	Surety Brand Cottonseed Meal	Schoolcraft	8.9	37.1	6.7	14.5	85.00
B 3310	Surety Brand Cottonseed Meal	Mason	8.3	36.3	6.0	13.5	55.00
B 3320	Surety Brand Cottonseed Meal	Detroit	8.6	37.9	6.2	13.5	55.00
Average			8.6	36.3	6.8	12.7	
J. E. Bartlett Co., Jackson, Mich.							
B 2666	Farmer Brand Prime Cottonseed Meal	Jackson	{ G. F. 8.8	38.6	5.0	18.0	\$60.00
B 2900	Farmer Brand Prime Cottonseed Meal	Albion	8.9	40.0	6.8	10.9	14.00
B 2910	Farmer Brand Prime Cottonseed Meal	Constantine	8.8	40.8	7.0	10.0	58.00
B 3098	Farmer Brand Prime Cottonseed Meal	Allegan	6.8	40.1	6.3	12.0	58.00
Average			8.3	39.4	7.0	10.7	
F. W. Brode & Co., Memphis, Tenn.							
B 1868	Farmer Brand Straight Cottonseed Meal	Coldwater	{ G. F. 8.3	36.0	6.0	12.0	\$54.00
B 1869	Farmer Brand Straight Cottonseed Meal	Adrian	7.5	45.6	7.9	7.8	53.50
B 2486	Farmer Brand Straight Cottonseed Meal	Coopersville	8.7	36.3	7.0	14.1	51.00
B 2632	Farmer Brand Straight Cottonseed Meal	Kalamazoo	8.5	37.5	6.7	12.0	54.00
B 2822	Farmer Brand Straight Cottonseed Meal	Marlette	8.0	35.8	8.5	12.2	56.00
B 2904	Farmer Brand Straight Cottonseed Meal	Three Rivers	8.2	35.4	6.6	13.2	58.00
B 2930	Farmer Brand Straight Cottonseed Meal	Morrice	8.7	33.8	7.4	14.1	55.00
B 3018	Farmer Brand Straight Cottonseed Meal	Mt. Pleasant	6.5	36.3	6.5	10.5	56.00
B 3206	Farmer Brand Straight Cottonseed Meal	Oxford	8.8	36.9	7.5	12.1	56.00
B 3207	Farmer Brand Straight Cottonseed Meal	Rochester	8.3	35.9	6.9	15.1	56.00
B 3266	Farmer Brand Straight Cottonseed Meal	Constantine	8.3	35.8	6.4	15.2	58.00
B 3274	Farmer Brand Straight Cottonseed Meal	Hillsdale	8.2	36.6	6.7	12.4	2 90
B 3282	Farmer Brand Straight Cottonseed Meal	Kalamazoo	9.1	36.6	6.6	12.8	57.00
B 3283	Farmer Brand Straight Cottonseed Meal	Kalamazoo	8.9	35.7	7.0	12.8	57.00
B 3298	Farmer Brand Straight Cottonseed Meal	Battle Creek	6.8	34.9	6.3	17.1	57.00
Average			8.2	36.1	7.0	13.0	
F. W. Brode & Co., Memphis, Tenn.							
B 2823	Jay Brand Cottonseed Meal	Fremont	{ G. F. 8.4	36.0	5.0	14.0	\$52.00
B 2963	Jay Brand Cottonseed Meal	Saginaw	9.6	36.2	5.3	11.7	2 90
B 2999	Jay Brand Cottonseed Meal	Pontiac	9.1	36.8	5.8	11.3	60.00
B 3026	Jay Brand Cottonseed Meal	Reed City	7.9	36.5	6.5	13.8	60.00
B 3027	Jay Brand Cottonseed Meal	Reed City	7.8	36.2	6.3	13.3	58.00
B 3035	Jay Brand Cottonseed Meal	Le Roy	8.5	35.7	6.8	13.2	60.00
B 3120	Jay Brand Cottonseed Meal	Rockford	8.8	37.5	6.9	14.1	54.00
B 3125	Jay Brand Cottonseed Meal	Jamestown	9.1	35.9	6.6	14.1	54.00
Average			8.5	36.5	6.4	12.7	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
F. W. Bradie & Co., Memphis, Tenn.—Concluded.							
B 2582	Owl Brand Cottonseed Meal.....	Sparta..... { G.*	8.4	41.00	6.0	10.0	55.50
B 3097	Owl Brand Cottonseed Meal.....	Allegan..... { F.*	7.5	41.3	8.0	9.3	60.00
		Average.....	8.0	41.9	7.2	9.9	.....
Buckeye Cotton Oil Co., Cincinnati, Ohio.							
B 2672	Buckeye Good Cottonseed Meal.....	Jamestown..... { G.*	8.2	36.0	5.0	14.0	54.00
B 2688	Buckeye Good Cottonseed Meal.....	Ypsilanti..... { F.*	8.6	35.3	6.0	15.4	58.00
B 2960	Buckeye Good Cottonseed Meal.....	Lansing.....	8.6	34.4	7.0	13.7	2.85
B 2973	Buckeye Good Cottonseed Meal.....	Birch Run.....	8.2	39.1	6.9	10.2	2.85
B 3039	Buckeye Good Cottonseed Meal.....	Big Rapids.....	8.1	35.5	5.2	15.1	60.00
B 3214	Buckeye Good Cottonseed Meal.....	Chesaning.....	8.8	35.2	5.7	15.9	55.00
B 3299	Buckeye Good Cottonseed Meal.....	Battle Creek.....	8.6	33.9	7.7	14.6	60.00
B 3308	Buckeye Good Cottonseed Meal.....	Lansing.....	8.2	36.0	5.4	15.5	56.00
		Average.....	8.4	35.4	6.3	14.5	.....
S. P. Davis, Little Rock, Ark.							
B 3017	Good Luck Brand Cottonseed Meal.....	Mt. Pleasant..... { G.*	7.6	41.0	6.0	9.0	.....
B 3021	Good Luck Brand Cottonseed Meal.....	Shepherd..... { F.*	8.0	37.6	5.8	14.3	60.00
		Average.....	7.8	37.8	6.0	14.0	.....
B 2687	Veribest Cottonseed Meal.....	Watervliet..... { G.*	8.7	38.5	6.0	10.0	60.00
B 2858	Veribest Cottonseed Meal.....	Elkton..... { F.*	8.1	39.0	6.8	11.3	60.00
B 3329	Veribest Cottonseed Meal.....	Clinton.....	8.3	35.2	6.0	14.2	.....
		Average.....	8.4	37.1	6.2	11.5	60.00
East St. Louis Cotton Oil Co., National Stock Yards, Ill.							
B 2795	East St. Louis Cottonseed Meal.....	Ann Arbor..... { G.*	8.4	38.5	6.0	12.0	.....
		..... { F.*	8.4	40.0	6.8	10.5	58.50
B 1870	St. Clair Brand Cottonseed Meal.....	Adrian..... { G.*	7.6	36.0	5.0	16.0	.....
B 1982	St. Clair Brand Cottonseed Meal.....	Clinton..... { F.*	8.8	35.5	5.7	14.4	53.50
B 1986	St. Clair Brand Cottonseed Meal.....	Blissfield.....	7.7	38.7	6.6	11.2	53.00
B 2571	St. Clair Brand Cottonseed Meal.....	N. Muskegon.....	8.0	36.1	6.4	13.3	55.00
B 2601	St. Clair Brand Cottonseed Meal.....	Holland.....	8.0	38.0	6.2	12.3	61.00
B 2618	St. Clair Brand Cottonseed Meal.....	Plainwell.....	9.4	38.9	6.7	12.5	56.00
B 2745	St. Clair Brand Cottonseed Meal.....	Leslie.....	8.5	36.7	6.4	12.1	3.00
B 2906	St. Clair Brand Cottonseed Meal.....	Manchester.....	7.7	39.6	6.7	11.6	.....
B 2811	St. Clair Brand Cottonseed Meal.....	Grass Lake.....	8.8	38.8	6.7	11.6	55.00
B 3103	St. Clair Brand Cottonseed Meal.....	Coopersville.....	8.7	36.1	5.8	13.6	55.00
B 3106	St. Clair Brand Cottonseed Meal.....	Grandville.....	9.5	34.6	5.4	14.2	.....
B 3107	St. Clair Brand Cottonseed Meal.....	Vriesland.....	8.1	37.6	6.9	11.4	60.00
B 3223	St. Clair Brand Cottonseed Meal.....	Richmond.....	8.8	36.5	6.5	12.3	3.00
B 3251	St. Clair Brand Cottonseed Meal.....	Adrian.....	9.2	36.1	5.6	13.8	2.83
B 3261	St. Clair Brand Cottonseed Meal.....	Kalamasoo.....	8.9	36.0	5.8	13.7	55.00
B 3294	St. Clair Brand Cottonseed Meal.....	Plainwell.....	8.8	35.9	6.0	14.2	3.00
B 3301	St. Clair Brand Cottonseed Meal.....	Jackson.....	8.8	36.4	5.5	12.7	58.00
		Average.....	8.5	36.7	6.2	12.8	.....
Feeders Supply Co., Kansas City, Mo.							
B 2636	Equity Brand Cottonseed Meal.....	Kalamasoo..... { G.*	7.6	36.0	5.0	14.0	.....
		..... { F.*	7.6	36.8	7.6	11.8	58.00
Hayes Grain & Commission Co., Little Rock, Ark.							
B 2873	Arkansaw Brand Cottonseed Meal.....	Jackson..... { G.*	6.7	36.0	5.0	15.0	.....
B 2991	Arkansaw Brand Cottonseed Meal.....	Holly..... { F.*	8.1	35.1	5.8	16.0	.....
B 3302	Arkansaw Brand Cottonseed Meal.....	Jackson.....	8.0	37.4	6.0	15.1	.....
		Average.....	8.0	36.7	6.2	12.6	58.00
		Average.....	7.6	36.4	6.0	14.6	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Humphreys-Godwin Co., Memphis, Tenn.						
B 2508	Danish Cottonseed Meal	Grand Rapids. { G.* F.*	8.0	36.0	5.0	15.0	
B 2535	Danish Cottonseed Meal	Grandville	7.5	35.8	6.9	14.5	\$54.00
B 2557	Danish Cottonseed Meal	Muskegon	7.9	34.7	6.3	13.6	55.00
B 2574	Danish Cottonseed Meal	Sparta	8.2	37.5	7.0	12.7	58.00
B 2583	Danish Cottonseed Meal	Vriesland	7.9	36.2	6.3	13.9	57.00
B 2591	Danish Cottonseed Meal	Forrest Grove	7.9	37.0	6.8	12.9	55.00
B 2674	Danish Cottonseed Meal	Fennville	8.7	34.6	5.8	15.0	57.00
B 3054	Danish Cottonseed Meal	Grand Rapids	8.6	38.0	6.4	12.2	60.00
B 3100	Danish Cottonseed Meal	Conklin	8.0	37.6	5.9	13.7	55.00
B 3117	Danish Cottonseed Meal	Petokey	7.6	36.1	6.1	14.6	62.00
		Average	8.0	36.7	6.3	13.9	
B 3136	Dixie Brand Cottonseed Meal	Fremont. { G.* F.*	8.4	41.0 42.7	5.5 7.6	10.0 9.2	57.00
	Interstate Feed Association, Detroit, Mich.						
B 2953	Superior Brand Cottonseed Meal	Bay City. { G.* F.*	8.4	38.6 39.4	6.0 7.3	12.0 10.2	3.25
B 3216	Superior Brand Cottonseed Meal	Eaton Rapids	9.4	38.8	7.5	11.0	3.00
		Average	8.9	39.1	7.4	10.6	
	National Feed Co., St. Louis, Mo.						
B 2896	Cottonseed Meal	Devereaux. { G.* F.*	9.2	38.5 40.2	6.5 7.5	14.0 9.7	
	W. C. Northern, Little Rock, Ark.						
B 3057	Butterfly Meal	Grand Rapids. { G.* F.*	8.5	38.6 38.7	6.0 6.1	12.0 10.6	60.00
B 3045	Standard Brand Cottonseed Meal	Cedar Springs. { G.* F.*	8.2	36.0 37.0	5.0 5.8	12.0 14.2	60.00
B 3048	Standard Brand Cottonseed Meal	Comstock Park	9.3	35.0	5.7	15.5	57.00
		Average	8.8	36.0	5.8	14.9	
	Wagner White Co., Inc., Jackson, Mich.						
B 2625	Wawoo Brand Cottonseed Meal	Marshall. { G.* F.*	7.4	36.0 37.4	5.0 6.4	22.0 13.1	
B 2731	Wawoo Brand Cottonseed Meal	Mason	7.6	31.7	5.9	16.3	3.75
B 2796	Wawoo Brand Cottonseed Meal	Mt. Clemens	7.6	36.9	7.6	11.6	2.70
		Average	7.5	35.3	6.6	13.7	
	E. L. Wellman, Grand Rapids, Mich.						
B 2675	Feeders Favorite Cottonseed Meal	Fennville. { G.* F.*	8.3	38.6 41.4	6.0 7.4	12.0 10.5	50.00
B 3032	Feeders Favorite Cottonseed Meal	Cadillac	8.1	36.5	6.8	12.7	60.00
B 3151	Feeders Favorite Cottonseed Meal	Coopersville	8.7	37.2	8.1	13.5	57.00
		Average	8.4	38.4	7.4	12.2	
	COTTONSEED FEED.						
	American Cotton Oil Co., New York, N. Y.						
B 2633	Columbia Cottonseed Feed	Kalamasoo. { G.* F.*	8.6	20.5 23.8	3.0 4.3	25.0 22.9	50.00
B 3029	Columbia Cottonseed Feed	Reed City	9.8	19.7	3.4	24.0	
		Average	9.2	21.8	3.9	23.5	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
S. P. Davis, Little Rock, Ark.							
B 2692	Beauty Brand Cottonseed Feed	Benton Harbor. { G.*	36.0	6.0	14.0		
B 3010	Beauty Brand Cottonseed Feed	Lake Odessa. { F.*	9.2	36.2	6.4	12.2	\$60 00
B 3244	Beauty Brand Cottonseed Feed	Flint.....	7.8	35.6	5.9	13.3	
			8.5	35.8	6.0	13.6	
		Average.....	8.5	35.9	6.1	13.0	
Humphreys-Godwin Co., Memphis, Tenn.							
B 3053	No. 77 Cottonseed Feed	Grand Rapids. { G.*	20.0	4.0	28.0		
B 3099	No. 77 Cottonseed Feed	Conklin. { F.*	8.7	20.2	3.2	26.4	50 00
			8.0	21.1	3.2	25.7	40 00
		Average.....	8.4	20.7	3.2	26.1	
Tennessee Fibre Co., Memphis, Tenn.							
B 3260	Creamo Brand Cottonseed Feed	Jackson. { G.*	20.0	4.0	25.0		
			10.4	19.0	3.7	22.2	\$2 25
LINSEED MEAL							
American Linseed Co., Buffalo, N. Y.							
B 2509	O. P. Linseed Oil Meal	Grand Rapids. { G.*	34.0	5.0	8.0		
B 2565	O. P. Linseed Oil Meal	Muskegon. { F.*	10.0	34.3	5.4	8.2	60 00
B 2659	O. P. Linseed Oil Meal	Battle Creek	9.2	38.0	6.0	7.4	66 00
B 2715	O. P. Linseed Oil Meal	Hudson	9.0	36.6	6.1	7.8	63 00
B 2787	O. P. Linseed Oil Meal	Ann Arbor	9.7	34.7	5.4	8.5	8.20
B 2833	O. P. Linseed Oil Meal	Imlay City	9.1	36.5	6.1	7.3	3.15
B 2929	O. P. Linseed Oil Meal	Morrice	9.0	38.4	6.5	7.2	3.00
B 2962	O. P. Linseed Oil Meal	Saginaw	8.4	36.8	6.2	7.7	3.25
			10.5	33.9	5.2	8.1	
		Average.....	9.4	36.2	5.9	7.8	
American Milling Co., Peoria, Ill.							
B 1991	Amco O. P. Linseed Meal	Morenci. { G.*	30.0	5.0	10.0		
B 2515	Amco O. P. Linseed Meal	Grand Rapids. { F.*	10.2	28.4	6.4	10.0	58 00
B 2711	Amco O. P. Linseed Meal	Adrian	10.3	28.4	6.0	10.0	64 00
B 2936	Amco O. P. Linseed Meal	Saginaw	10.0	27.7	6.2	10.0	59 00
B 2947	Amco O. P. Linseed Meal	Bay City	10.1	30.9	7.4	9.4	3 25
B 2961	Amco O. P. Linseed Meal	Saginaw	9.4	28.6	6.7	9.8	3 00
B 3005	Amco O. P. Linseed Meal	Mulliken	10.9	31.9	7.4	8.9	
B 3022	Amco O. P. Linseed Meal	Clare	9.3	32.1	6.8	9.3	70 00
B 3047	Amco O. P. Linseed Meal	Cedar Springs	10.5	32.8	6.3	3.7	65 00
B 3081	Amco O. P. Linseed Meal	Grand Rapids	9.5	31.9	5.2	8.8	65 00
B 3137	Amco O. P. Linseed Meal	Fremont	10.7	30.8	6.4	9.0	64 00
			10.0	31.1	6.4	10.5	63 00
		Average.....	10.1	30.2	6.5	9.0	
Archer Daniels Linseed Co., Minneapolis, Minn.							
B 2903	Old Process Ground Oil Cake Meal	Albion. { G.*	33.0	6.0	10.0		
			9.1	36.1	6.7	8.4	3 20
Chicago Heights Oil Manufacturing Co., Chicago, Illinois.							
B 1908	O. P. Lazo Cake Meal	Detroit. { G.*	25.0	6.0	12.0		
B 3233	O. P. Lazo Cake Meal	Royal Oak. { F.*	10.2	28.2	7.7	9.5	3 00
			9.3	31.1	7.5	9.4	3 15
		Average.....	9.8	29.7	7.6	9.5	
B 2685	O. P. Oil Meal	Hartford. { G.*	32.0	6.0	10.0		
			12.9	37.6	7.4	6.6	65 00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Hirst & Begley Linseed Co., Chicago, Illinois.							
B 2484	O. P. Linseed Cake Meal.....	Grand Rapids..... { G.*	9.8	34.0	6.0	9.0	
B 2526	O. P. Linseed Cake Meal.....	Zeeland..... { F.*	9.4	36.3	6.9	8.0	\$60 00
B 2542	O. P. Linseed Cake Meal.....	Holland.....	9.2	36.3	5.6	8.6	63 00
B 2584	O. P. Linseed Cake Meal.....	Vriesland.....	8.4	38.1	6.3	7.9	62 00
B 2593	O. P. Linseed Cake Meal.....	Forrest Grove.....	8.3	36.3	6.1	8.4	60 00
B 2670	O. P. Linseed Cake Meal.....	Jamestown.....	10.0	38.1	5.9	7.4	60 00
B 2673	O. P. Linseed Cake Meal.....	Jamestown.....	8.5	36.1	6.7	7.9	60 00
B 2677	O. P. Linseed Cake Meal.....	Fennville.....	8.6	36.5	6.8	7.6	65 00
B 2730	O. P. Linseed Cake Meal.....	Mason.....	9.4	34.5	6.1	7.8	3 50
B 3084	O. P. Linseed Cake Meal.....	Grand Rapids.....	9.0	34.8	6.5	10.6	60 00
		Average.....	9.1	35.8	6.3	8.3	
Metzger Seed & Oil Co., Toledo, Ohio.							
B 1924	O. P. Oil Meal.....	Detroit..... { G.*	10.0	34.8	7.1	7.7	3 00
B 1947	O. P. Oil Meal.....	Detroit..... { F.*	8.8	35.1	5.1	7.7	57 00
B 1985	O. P. Oil Meal.....	Blissfield.....	9.3	36.7	7.4	7.7	60 00
B 3011	O. P. Oil Meal.....	Lake Odessa.....	9.3	38.4	6.3	7.6	
		Average.....	9.4	36.3	6.5	7.7	
Midland Linseed Products Co., Minneapolis, Minn.							
B 2630	O. P. Ground Linseed Cake.....	Kalamasoo..... { G.*	10.2	34.8	6.3	8.1	66 00
B 2693	O. P. Ground Linseed Cake.....	Benton Harbor..... { F.*	9.0	38.2	6.8	7.6	70 00
		Average.....	9.6	36.5	6.6	7.9	
Milwaukee Linseed Oil Works, Milwaukee, Wis.							
B 2598	O. P. Ground Linseed Cake.....	Holland..... { G.*	10.1	33.9	5.0	10.0	60 00
					7.4	7.6	
Sherwin Williams Co., Cleveland, Ohio.							
B 3247	S. W. C. Linseed Oil Meal.....	Adrian..... { G.*	9.3	33.0	6.0	8.0	3 05
				37.1	6.6	9.0	
Spencer-Kellogg Co., Inc., Buffalo, N. Y.							
B 2612	Pure O. P. Oil Meal.....	Moline..... { G.*	9.4	37.2	5.8	7.6	63 00
B 2741	Pure O. P. Oil Meal.....	Leslie..... { F.*	10.8	32.8	5.8	8.5	3 50
B 2868	Pure O. P. Oil Meal.....	Jackson.....	9.3	37.6	6.5	7.5	3 10
B 3149	Pure O. P. Oil Meal.....	Berlin.....	10.5	37.3	6.4	7.3	65 00
		Average.....	10.0	36.2	6.1	7.7	
Toledo Seed & Oil Co., Toledo, Ohio.							
B 1883	Major Brand O. P. Oil Meal.....	Detroit..... { G.*	9.4	33.1	6.5	9.1	2 96
B 1955	Major Brand O. P. Oil Meal.....	Detroit..... { F.*	8.5	33.3	6.4	8.8	3 00
B 1958	Major Brand O. P. Oil Meal.....	Detroit.....	8.9	33.5	6.3	8.2	2 90
B 2619	Major Brand O. P. Oil Meal.....	Plainwell.....	10.1	34.8	5.9	8.2	65 00
B 2681	Major Brand O. P. Oil Meal.....	Bangor.....	10.8	33.6	6.2	7.9	70 00
B 2700	Major Brand O. P. Oil Meal.....	Greenville.....	10.6	33.5	6.0	8.3	60 00
B 2775	Major Brand O. P. Oil Meal.....	Lansing.....	8.8	35.4	6.2	7.5	3 50
B 2945	Major Brand O. P. Oil Meal.....	Gladwin.....	10.9	37.0	5.9	7.4	3 50
		Average.....	9.8	34.3	6.2	8.2	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
DISTILLERS' DRIED GRAINS.							
Chiefly from Corn.							
Continental Cereal Co., Peoria, Ill.							
B 2801	Continental Gluten Feed	Monroe..... { G.*	29.0	10.0	10.0	.....	.....
B 2894	Continental Gluten Feed	Ypsilanti..... { F.*	7.2	34.3	10.3	9.9	.....
B 3245	Continental Gluten Feed	Flint.....	6.1	36.9	15.8	8.9	.....
			7.6	32.0	10.7	9.4	.....
		Average.....	7.0	34.4	12.3	9.4	.....
The Dewey Bros. Co., Blanchester, Ohio.							
B 3303	Eagle 3 D Grains.....	Leslie..... { G.*	30.0	10.0	13.0	.....	.....
			29.3	10.1	10.1	17.5	\$3 25
YEAST AND VINEGAR DRIED GRAINS.							
J. E. Bartlett Co., Jackson, Mich.							
B 2726	Bartlett's Malt By-Product.....	North Adams..... { G.*	18.0	5.0	14.0	.....	.....
B 2863	Bartlett's Malt By-Product.....	Jackson..... { F.*	6.8	20.8	7.6	15.2	.....
			7.1	21.1	5.2	11.0	2 25
		Average.....	7.0	21.1	6.4	13.1	.....
The Fleischmann Co., Chicago, Ill.							
B 2546	Fleischmann's Dried Grains.....	Nunica..... { G.*	19.0	7.0	19.0	.....	.....
B 2867	Fleischmann's Dried Grains.....	Jackson..... { F.*	8.1	17.3	6.1	18.8	52 00
B 3085	Fleischmann's Dried Grains.....	Grand Rapids.....	6.7	18.2	6.4	18.0	2 50
B 3142	Fleischmann's Dried Grains.....	Grand Rapids.....	8.0	17.9	5.0	18.0	53 00
			7.7	18.4	6.1	18.4	.....
		Average.....	7.6	18.0	5.9	18.3	.....
B 2746	Fleischmann's Dried Malt Grains.....	Leslie..... { G.*	22.0	7.0	17.0	.....	.....
B 2869	Fleischmann's Dried Malt Grains.....	Jackson..... { F.*	5.0	23.8	9.4	15.1	2 50
B 3102	Fleischmann's Dried Malt Grains.....	Coopersville.....	5.4	22.4	8.8	16.4	.....
			6.1	24.6	9.5	15.5	48 00
		Average.....	5.5	23.6	9.2	15.7	.....
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 2585	Dried Brewers Grains.....	Vriesland..... { G.*	25.1	5.0	12.7	.....	.....
B 2654	Dried Brewers Grains.....	Battle Creek..... { F.*	8.4	31.2	4.8	11.3	50 00
B 2716	Dried Brewers Grains.....	Hudson.....	5.6	29.4	5.8	12.1	45 00
B 2802	Dried Brewers Grains.....	Monroe.....	6.7	25.2	5.4	10.7	2 50
			8.8	31.9	5.5	11.9	.....
		Average.....	7.6	31.9	5.4	11.5	.....
DRIED BREWERS' GRAINS.							
K. & E. Neumond, St. Louis, Mo.							
B 1941	Goldnes Kalb Dried Brewers Grains.....	Detroit..... { G.*	24.0	6.0	13.0	.....	.....
			7.0	24.3	5.1	15.2	.....
CORN GLUTEN FEED							
American Malze Products Co., New York, N. Y.							
B 2789	Cream of Corn Gluten Feed.....	Ann Arbor..... { G.*	23.0	1.5	8.5	.....	.....
B 2792	Cream of Corn Gluten Feed.....	Ann Arbor..... { F.*	10.0	25.0	1.6	6.2	2 65
			9.7	24.5	1.4	6.0	53 00
		Average.....	9.9	24.8	1.5	6.1	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Clinton Sugar Refining Co., Clinton, Iowa.							
B 2712	Clinton Corn Gluten Feed	Adrian..... { G.* F.*	8.5	23.0 26.0	3.0 2.4	8.0 7.0	\$58 00
Corn Products Refining Co., New York, N. Y.							
B 1920	Buffalo Corn Gluten Feed	Detroit..... { G.* F.*	9.7	23.0 25.0	1.0 3.2	8.5 7.7	2 75
B 1945	Buffalo Corn Gluten Feed	Detroit.....	8.4	23.9	1.5	8.1	54 00
B 1994	Buffalo Corn Gluten Feed	Morenci.....	9.5	23.0	1.4	7.2	57 00
B 2476	Buffalo Corn Gluten Feed	Grand Rapids.....	9.5	28.3	1.4	7.4	56 00
B 2765	Buffalo Corn Gluten Feed	Lansing.....	12.6	25.7	1.3	7.4	3 25
B 2777	Buffalo Corn Gluten Feed	Lansing.....	9.8	29.2	1.5	6.7	3 00
	Average.....		9.8	27.5	1.7	7.4	
Douglas Company, Cedar Rapids, Ia.							
B 2567	Douglas Corn Gluten Feed	Muskegon..... { G.* F.*	8.8	23.0 26.7	1.0 1.6	8.0 8.4	52 00
B 2704	Douglas Corn Gluten Feed	Adrian.....	8.9	26.3	1.4	6.6	58 00
	Average.....		8.9	26.5	1.5	7.5	
J. C. Hubinger Bros. Co., Keokuk, Ia.							
B 2892	KKK Corn Gluten Feed.....	Ypsilanti..... { G.* F.*	9.0	23.0 22.1	2.4 3.6	7.5 6.6	60 00
Huron Milling Co., Harbor Beach, Mich.							
B 2830	Jenks Corn Gluten Feed	Pad Axe..... { G.* F.*	7.9	22.0 25.2	3.0 4.7	8.0 7.6	3 00
B 2838	Jenks Corn Gluten Feed	Pt. Huron.....	9.2	25.6	4.2	7.4	57 00
B 2857	Jenks Corn Gluten Feed	Harbor Beach.....	8.2	25.4	3.0	7.7	2 95
	Average.....		8.4	25.4	4.0	7.6	
CORN GLUTEN MEAL.							
Corn Products Refining Co., New York, N. Y.							
B 2773	Diamond Corn Gluten Meal	Lansing..... { G.* F.*	6.6	40.0 44.1	1.0 0.7	4.0 1.2	
HOMINY FEEDS.							
Beck Cereal Co., Detroit, Mich.							
B 3237	Royal Hominy Feed Meal	Detroit..... { G.* F.*	11.5	10.0 10.4	6.0 5.8	6.0 4.3	
B 3239	Royal Hominy Feed Meal	Detroit.....	13.1	10.6	6.9	5.0	
	Average.....		12.3	10.5	6.4	4.7	
Evans Milling Co., Indianapolis, Indiana.							
B 3230	Hominy Feed.....	Birmingham..... { G.* F.*	10.6	10.0 10.0	7.5 6.8	7.0 4.7	3 10
Chas. A. Krause Milling Co., Milwaukee, Wisconsin.							
B 1951	Badger Hominy Feed	Detroit..... { G.* F.*	5.2	10.0 11.3	6.0 6.6	5.0 4.5	
B 1978	Badger Hominy Feed	Clinton.....	10.8	11.1	7.4	4.8	65 00
B 2475	Badger Hominy Feed	Grand Rapids.....	9.6	11.4	7.5	5.6	62 00
B 2559	Badger Hominy Feed	Muskegon.....	9.2	10.2	8.3	4.9	65 00
	Average.....		8.7	11.0	7.7	5.0	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
CORN OIL CAKE MEAL.							
American Hominy Co., Indianapolis, Indiana.							
B 3257	Homcoline Feed.....	Jackson.....	{ G.* F.* 6.4	17.0 17.0	5.0 7.5	7.0 4.7	.....
Chicago Heights Oil Mfg. Co., Chicago, Illinois.							
B 2755	Heights Corn Oil Cake Meal.....	St. Johns.....	{ G.* F.* 10.6	18.0 23.7	8.0 7.0	10.0 8.4	.....
B 3156	Heights Corn Oil Cake Meal.....	Holland.....	13.2	16.9	7.8	7.0	\$3 00
Clinton Sugar Refining Co., Clinton, Iowa.							
		Average.....	11.9	20.3	7.4	7.7	.....
B 2880	Clinton Corn Oil Cake Meal.....	Morenci.....	{ G.* F.* 8.9	20.0 19.8	7.7 10.4	12.0 8.2	66 00
Corn Products Refining Co., New York, N. Y.							
B 2905	Argo Corn Oil Cake Meal.....	Constantine.....	{ G.* F.* 9.3	18.0 19.5	7.0 11.4	13.0 10.0	3 50
B 2907	Argo Corn Oil Cake Meal.....	Constantine.....	10.7	19.1	8.9	9.1	3 25
		Average.....	10.0	19.3	10.2	9.6	.....
B 2981	Diamond Hog Meal.....	Adrian.....	{ G.* F.* 9.7	18.0 20.6	7.0 9.2	13.0 9.4	.....
B 3138	Diamond Hog Meal.....	Fremont.....	8.9	16.7	11.7	10.9	65 00
		Average.....	9.3	18.7	10.5	10.2	.....
CORN FEED MEAL.							
Commercial Milling Co., Detroit, Mich.							
B 1902	Henkel's Coarse Feed Corn Meal.....	Detroit.....	{ G.* F.* 10.8	8.5 11.8	..... 6.1	2.0 2.9	.....
B 1919	Henkel's Coarse Feed Corn Meal.....	Detroit.....	11.8	10.4	5.9	2.7	.....
		Average.....	11.3	11.1	6.0	2.8	.....
Dahne Walker Milling Co., Union City, Tenn.							
B 2641	Danco Feed Offal from White Corn.....	Allegan.....	{ G.* F.* 10.2	10.0 9.6	7.0 6.6	6.0 7.0	70 00
B 2907	Danco Feed Offal from White Corn.....	Allegan.....	10.8	10.4	6.3	7.2	3 75
		Average.....	10.5	10.0	6.5	7.1	.....
Darrah Milling Co., Big Rapids, Mich.							
B 3040	Unbolted Corn Meal.....	Big Rapids.....	{ G.* F.* 13.8	10.2 9.1	4.6 4.4	3.2 2.5	80 00
King Milling Co., Lowell, Mich.							
B 2469	King Corn Meal.....	Coopersville.....	{ G.* F.* 12.4	9.5 9.7	7.3 5.3	3.6 4.2	78 00
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 2751	Badger Maize Reddog Flour.....	St. Johns.....	{ G.* F.* 11.2	10.5 11.9	2.0 8.8	2.0 2.4	3 25

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Larrows Milling Co., Detroit, Mich.							
B 3232	Corn Feed Meal.....	Birmingham.....	{ G.* 9.0 F.* 10.7	9.0 10.0	5.0 6.2	6.0 4.8	..... \$3 10
B 3277	Corn Feed Meal.....	Tecumseh.....	14.0	8.8	5.0	4.3	70 00
		Average.....	12.4	9.4	5.6	4.6	.....
David Stett Flour Mill Co., Detroit, Mich.							
B 3315	Yellow Corn Feed Meal.....	Detroit.....	{ G.* 10.0 F.* 12.5	10.0 9.6	6.0 5.2	5.0 4.8	..... 3 90
Valley City Milling Co., Grand Rapids, Mich.							
B 2504	Rowena Coarse Meal with ground screenings not exceeding mill run.....	Grand Rapids.....	{ G.* 9.1 F.* 12.1	9.1 10.1	4.5 4.7	3.0 3.1	..... 80 00
B 2520	Rowena Coarse Meal with ground screenings not exceeding mill run.....	Grand Rapids.....	11.6	9.6	5.8	3.5	82 00
B 2592	Rowena Coarse Meal with ground screenings not exceeding mill run.....	Forrest Grove.....	11.5	9.8	5.5	2.8	82 00
B 3078	Rowena Coarse Meal with ground screenings not exceeding mill run.....	Grand Rapids.....	12.9	9.6	5.5	3.1	74 00
		Average.....	12.0	9.8	5.4	3.1	.....
Watson Higgins Milling Co., Grand Rapids, Mich.							
B 3141	Corn Feed Offal.....	Grand Rapids.....	{ G.* 10.5 F.* 11.0	10.5 10.6	8.0 8.4	7.0 6.3	..... 60 00
B 3147	Corn Feed Offal.....	Hudsonville.....	12.3	10.7	4.5	4.8	.....
		Average.....	11.7	10.7	6.5	5.8	.....
ANIMAL BY-PRODUCTS.							
Darling & Company, Chicago, Illinois.							
B 2725	Darling's 60% Digester Tankage.....	North Adams.....	{ G.* 60.0 F.* 9.9	60.0 61.3	0.5 0.7	3.0 3.0	..... 4 75
B 3297	Darling's 60% Digester Tankage.....	Galesburg.....	9.7	70.0	2.0	4.2	5 50
		Average.....	9.8	65.7	1.4	3.6	.....
B 3296	Darling's 40% Feeding Tankage.....	Galesburg.....	{ G.* 40.0 F.* 10.5	40.0 46.6	0.5 1.1	5.0 6.0	..... 4 50
B 2866	Granulated Bone for Poultry.....	Jackson.....	{ G.* 20.0 F.* 7.1	20.0 26.1	0.5 1.4	3.0 1.3	..... 4 50
B 3201	Granulated Bone for Poultry.....	Pontiac.....	6.7	24.4	4.7	1.6	4 25
		Average.....	6.9	25.3	3.2	1.5	.....
B 1878	Darling's 50% Meat Scraps.....	Detroit.....	{ G.* 50.0 F.* 8.3	50.0 54.4	0.5 7.0	3.0 3.7	..... 4 35
B 1927	Darling's 50% Meat Scraps.....	Detroit.....	8.7	54.9	6.9	4.3	4 00
B 2512	Darling's 50% Meat Scraps.....	Grand Rapids.....	8.4	53.4	6.6	3.3	5 00
B 2605	Darling's 50% Meat Scraps.....	Holland.....	9.1	57.4	6.3	3.7	95 00
B 2680	Darling's 50% Meat Scraps.....	Bangor.....	9.1	52.6	7.4	3.3	100 00
B 3067	Darling's 50% Meat Scraps.....	Zeeland.....	7.9	54.2	8.0	3.4	5 75
B 3328	Darling's 50% Meat Scraps.....	Morenci.....	11.3	56.1	1.4	3.3	5 50
		Average.....	9.0	54.7	6.2	3.6	.....
B 2747	Darling's Standard Meat Scraps.....	St. Johns.....	{ G.* 45.0 F.* 9.8	45.0 54.1	0.5 5.3	3.0 4.6	..... 5 00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Hartman Tankage Works, Grand Rapids, Mich.						
B 2096	Hartman Tankage.....	Grand Rapids. { G.* F.*	8.8	48.0 48.8	2.5 10.3	1.0 2.1	\$90 00
	Millenbach Bros., Detroit, Mich.						
B 1928	Millenbach's Mixed Beef Scraps.....	Detroit..... { G.* F.*	8.8	45.0 50.0	10.0 10.2	2.3	4 00
	Morris & Company, Chicago, Ill.						
B 2754	Big Brand Digester Tankage.....	St. Johns..... { G.* F.*	7.4	60.0 59.1	7.0 8.2	5.0 3.3	5 00
	Swift & Company, Chicago, Ill.						
B 1984	Digester Tankage.....	Blissfield..... { G.* F.*	7.8	60.0 61.2	6.0 0.5	3.0 1.7	95 00
B 2710	Digester Tankage.....	Adrian.....	8.5	65.0	4.6	1.5	5 00
B 3203	Digester Tankage.....	Pontiac.....	7.3	62.5	6.8	2.1	5 00
	Average.....		7.9	62.9	4.0	1.8	.....
B 2499	Meat Scraps.....	Grand Rapids. { G.* F.*	7.0	50.0 52.8	8.0 9.5	3.0 3.6	98 00
B 2709	Meat Scraps.....	Adrian.....	6.0	53.7	9.6	2.6	5 00
B 2763	Meat Scraps.....	Lansing.....	6.6	50.6	9.6	2.6	5 00
B 3202	Meat Scraps.....	Pontiac.....	7.3	54.9	10.0	2.5	5 00
	Average.....		6.7	53.0	9.7	2.8	.....
B 1927	Poultry Bone Meal.....	Detroit..... { G.* F.*	6.9	25.0 17.6	2.0 5.0	3.0 1.3	2 25
B 3205	Poultry Bone Meal.....	Pontiac.....	8.4	25.2	1.6	0.7	4 25
	Average.....		7.7	21.4	3.2	1.0	.....
B 2713	Soluble Blood Flour.....	Adrian..... { G.* F.*	9.6	80.0 83.5	..... 14.4	3.0 1.0	7 00
	S. I. Treat & Son, Coldwater, Mich.						
B 3218	Old Hoss Brand Tankage.....	Coldwater..... { G.* F.*	7.7	44.9 52.8	7.7 12.7	1.4 4.6	70 00
	ALFALFA MEAL.						
	American Milling Co., Peoria, Ill.						
B 1922	Alfalfa Meal.....	Detroit..... { G.* F.*	8.9	12.0 13.4	..... 1.3	35.0 29.1	.....
B 3231	Alfalfa Meal.....	Birmingham.....	8.6	15.9	2.2	28.6	2 00
	Average.....		8.8	14.7	1.8	28.9	.....
	Deaver Alfalfa Milling & Products Co., Hartman, Colorado.						
B 3325	Alfalfa Meal.....	Detroit..... { G.* F.*	9.2	12.0 15.0	1.5 1.2	35.0 30.5	2 40
	Henderson Milling Co., Grand Rapids, Mich.						
B 2479	Alfalfa Meal.....	Grand Rapids. { G.* F.*	8.3	16.3 14.6	1.5 1.6	29.2 29.2	39 00
B 2493	Alfalfa Meal.....	Grand Rapids.....	8.9	16.3	1.5	29.2	45 00
B 3079	Alfalfa Meal.....	Grand Rapids.....	9.7	16.8	1.9	21.3	45 00
	Average.....		9.0	15.9	1.7	26.6	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918-CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at						Price per ton or cwt.
			Moisture.	Crude protein.	Crude fat.	Crude fiber.		
	Chas. A. Krause Milling Co., Milwaukee, Wisconsin.							
B 2479	Alfalfa Meal.....	Grand Rapids..... { G.*	8.3	14.0	1.0	30.0		
B 2676	Alfalfa Meal.....	Fennville..... { F.*	9.4	14.6	1.6	29.2		
B 2772	Alfalfa Meal.....	Lansing.....	8.0	15.8	1.6	26.8		\$44.00
B 3052	Alfalfa Meal.....	Grand Rapids.....	9.1	15.6	1.2	28.1		2.50
		Average.....	8.7	16.3	1.4	28.0		

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
CALF MEAL.								
B 1933	American Milling Co., Peoria, Illinois. Sucrose Calf Meal.	Detroit. { G.* F.*	10.9 20.0 17.9	4.0 3.1	3.0 3.7	\$4 50	Lined meal, bone meal, blood flour, wheat middlings, corn meal, dried skim milk, malt flour, soluble starch.	
B 1923	Blatchford's Calf Meal Factory, Waukegan, Illinois. Blatchford's Calf Meal.	Detroit. { G.* F.*	10.7 24.0 24.7	5.0 6.5	6.8 7.4	4 50	Cottonseed meal, lined meal, blood meal, wheat flour, locust bean meal, unpressed flaxseed, barley and malt sprouts meal, rice polish, ground beans and peas, coconut meal, cocoa shell meal, dried milk, fennurgreek, anise, salt.	
B 1907 B 2498 B 2771	Blatchford's Calf Meal. Blatchford's Calf Meal. Blatchford's Calf Meal.	Adrian. Grand Rapids. Lansing.	10.3 10.1 11.2	24.8 21.6 25.8	6.4 7.8 7.1	6.9 7.0 7.5	5 00 84 00 4 75	Same as B 1923. Same as B 1923. Same as B 1923.
		Average.	10.6	24.2	7.0	7.2		
B 2768	Hales & Edwards Co., Chicago, Illinois. Red Horn Calf Meal.	Lansing. { G.* F.*	10.8 24.0 19.6	5.0 4.6	7.0 4.5	5 25	Lined meal, oat flour, red dog flour, alfalfa, corn flour, barley flour, dextrose, calcium carbonate, salt.	
B 2931	International Sugar Feed Co., Minneapolis, Minn. Grofast Calf Meal.	Morrise. { G.* F.*	9.1 25.0 27.1	5.0 6.3	10.0 8.6	5 00	Lined meal, red dog flour, grain screenings, locust bean meal, fennurgreek.	
B 3272	J. C. Martin Co., Mineral Point, Wis. Martin's Calf Feed.	Union City. { G.* F.*	10.2 26.0 25.0	6.0 6.9	6.0 7.1	5 00	Cottonseed meal, lined meal, gluten feed, germ middlings, wheat middlings, red dog flour, peanut oil meal, salt.	
B 2719 B 2883	The Quaker Oats Co., Chicago, Illinois. Schumacher Calf Meal. Schumacher Calf Meal.	Hudson. Reading. { G.* F.*	8.2 18.8 16.6	8.0 7.4 6.8	4.0 2.8 2.7	4 75 4 25	Cottonseed meal, wheat meal, ground flaxseed, milk albumen, bicarbonate of soda, oat meal. Oat meal, wheat, flaxseed meal, cottonseed meal, milk albumen bicarbonate of soda.	
		Average.	7.4	16.8	7.1	2.8		

*Abbreviations or Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
	Ralston Purina Co., St. Louis, Mo.							
B 3130	Purina Calf Chow Feed.	Jamesstown..... { G.* F.*	33.0 11.0	4.0 32.6	4.0 3.4	3.5 4.3	..... \$6 40	Linseed meal, hominy feed, wheat flour, corn feed meal, blood flour.
B 2845	Purina Calf Chow Feed.	Port Huron..... { F.*	10.4 33.2	3.2 3.5	3.2 3.5	3.5 4.3	..... 87 10	Linseed meal, corn meal, blood meal, ground flaxseed.
	Average.....		10.7	32.9	3.3	3.9	.....
	Ryde & Company, Chicago, Ill.							
B 1987	Ryde's Cream Calf Meal.	Morenci..... { G.* F.*	25.0 10.9	5.0 25.1	5.0 5.5	6.0 8.4	.....	Cottonseed meal, hominy feed, blood meal, wheat middlings, ground flaxseed, beans and lentils, cocoa shell meal, salt, fennel-greek, anise, locust bean meal.
B 2453	Ryde's Cream Calf Meal.	Grand Rapids..... { F.*	11.1 24.9	4.3 24.9	4.3 24.9	7.9 7.9	77 00	Cottonseed meal, hominy feed, blood flour, ground flaxseed, wheat flour, cocoa shell meal, locust bean meal, beans and peas, fennel-greek, anise, salt.
B 2696	Ryde's Cream Calf Meal.	St. Joseph..... { G.* F.*	10.6 24.2	5.1 24.2	5.1 24.2	7.9 7.9	.....	Same as B 2453.
B 2946	Ryde's Cream Calf Meal.	Bay City..... { F.*	9.5 24.5	4.5 24.5	4.5 24.5	8.6 6.2	4 50	Same as B 2453.
B 3279	Ryde's Cream Calf Meal.	Tecumseh..... { F.*	12.3 24.3	5.5 24.3	5.5 24.3	6.2 6.2	4 50	Same as B 2453.
	Average.....		10.9	24.6	5.0	7.8	.....
B 3134	E. L. Wellman, Grand Rapids, Mich. Wellman's Qualified Calf Meal.	Kent City..... { G.* F.*	18.0 9.3	8.0 16.3	8.0 7.7	4.0 3.2	.....	Linseed meal, wheat meal, oat meal, ground flaxseed, milk albumen, bicarbonate of soda.
B 2727	F. I. Williams & Son, North Adams, Mich. Williams Calf Meal.	North Adams..... { G.* F.*	18.0 10.2	3.0 19.3	3.0 2.3	7.0 3.3	4 00	Linseed meal, breakfast food by-products, blood meal (trace) anise, salt.
	HOG MEALS.							
B 1921	American Milling Co., Peoria, Illinois. Succene Hog Meal.	Detroit..... { G.* F.*	18.0 10.1	4.0 20.2	4.0 6.0	14.0 7.6	2 65	Linseed meal, corn, blood meal, alfalfa meal, corn feed meal, molasses, palm kernel meal, salt.
B 3323	Blanchford Calf Meal Factory, Waukegan, Illinois. Blanchford's Pig Meal.	Detroit..... { G.* F.*	19.0 9.9	5.0 20.6	5.0 6.3	7.0 7.6	94 00	Cottonseed meal, linseed meal, malt sprouts, wheat flour, oat meal, corn meal, locust bean meal, rice polish, cocoa shell meal, crushed flaxseed, bloodmeal, anise, salt.

Hales & Edwards Co., Chicago, Ill.

B 1976	Pioneer Hog Feed with dried buttermilk	Clinton	{ G. F. }	12.0 11.4	3.0 4.3	12.0 6.3	Lined meal, wheat middlings, corn feed meal, dried buttermilk, screenings.
B 2610	Pioneer Hog Feed with dried buttermilk	Holland		13.3 10.7	4.3 4.3	6.3 76 00	Lined meal, alfalfa meal, wheat middlings, corn feed meal, buck-wheat bran, dried buttermilk, grain screenings.
B 3070	Pioneer Hog Feed with dried buttermilk	Zeeland		10.7	14.4	8.2	Corn feed meal, wheat middlings, lined meal, wheat, barley and kaffir screenings, dried buttermilk.
		Average		10.9	14.1	7.1	
International Sugar Feed Co., Minneapolis, Minn.							
B 2735	International Hog Feed 6 per cent charcoal	Mason	{ G. F. }	22.5 11.9	5.0 5.0	12.0 12.3	Lined meal, wheat middlings, grain screenings, tankage, molasses, charcoal, salt.
B 2902	International Hog Feed 6 per cent charcoal	Albion		10.4	20.9	14.9	Same as B 2735.
		Average		11.2	21.9	13.6	
Chas. A. Krause Milling Co., Milwaukee, Wisconsin.							
B 2530	Krause Hog Feed	Zeeland	{ G. F. }	15.0 11.3	5.0 5.6	9.0 7.4	Alfalfa meal, hominy feed, wheat, wheat bran, wheat middlings, oats, corn feed meal, corn germ meal, digester tankage.
B 2596	Krause Hog Feed	Holland		16.7 9.8	5.6 14.8	7.4 68 00	Alfalfa meal, wheat bran and middlings, hominy feed, corn germ meal, corn feed meal, digester tankage, salt.
B 2642	Krause Hog Feed	Allegan		10.0	15.6	7.2	Alfalfa meal, wheat bran and middlings with screenings, hominy feed, corn germ meal, corn feed meal, corn bran, digester tankage, salt.
B 2832	Krause Hog Feed	Deerville		10.6	16.0	6.2	Same as B 2596.
B 3064	Krause Hog Feed	Zeeland		10.1	17.0	5.4	Same as B 2596.
B 3249	Krause Hog Feed	Adrian		10.9	16.6	10.8	Same as B 2596.
		Average		10.5	16.0	5.8	
Purina Mills Branch, Raisten Purina Co., St. Louis, Mo.							
B 2763	Purina Pig Chow	Ann Arbor	{ G. F. }	14.0 10.0	3.2 16.3	9.0 4.2	Alfalfa meal, corn feed meal, corn bran, digester tankage, charcoal, molasses, salt.
B 2844	Purina Pig Chow	Pt. Huron		10.0	17.1	9.6	Alfalfa meal, hominy feed, corn bran, blood meal, blood charcoal, molasses, salt.
B 2972	Purina Pig Chow	Birch Run		11.7	16.1	2.6	Alfalfa meal, corn feed meal, tankage, post, molasses, salt.
		Average		10.6	16.5	3.7	
The Quaker Oats Co., Chicago, Ill.							
B 3109	Big Pig Hog Feed	Cadillac	{ G. F. }	14.5 4.8	4.5 12.9	9.0 11.7	Oat middlings, oat shorts, oat hulls, corn feed meal, hominy feed, lined meal, gluten feed, wheat middlings, ground barley, palm kernel oil meal, flax screenings, calcium phosphate, salt.
B 3326	Big Pig Hog Feed	Elkton		9.6	13.4	3.4	Same as B 3109.
		Average		7.2	13.2	3.6	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Labo- ratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
E. L. Wellman, Grand Rapids, Mich.								
B 3062	Wellman's Qualified Hog Feed.....	Grand Rapids... { G.* F.*	9.4	13.5 13.1	4.0 3.5	13.0 12.8	\$55 00	Linseed meal, gluten feed, hominy feed, oat shorts, oat middlings, oat hulls, palm kernel meal, corn feed meal, ground barley, wheat middlings, salt.
B 3135	Wellman's Qualified Hog Feed.....	Fremont.....	9.3	13.3	3.9	12.2	60.00	Linseed meal, gluten feed, hominy feed, oat shorts, oat hulls, ground barley, oat middlings, salt.
B 3221	Wellman's Qualified Hog Feed.....	Almont.....	10.1	12.6	3.0	13.0	60.00	Linseed meal, gluten feed, hominy feed, oat shorts, oat hulls, ground barley, calcium phosphate, salt.
	DAIRY AND STOCK FEEDS.	Average.....	9.6	13.0	3.5	12.7	.....	Linseed meal, gluten feed, hominy feed, oat shorts, oat hulls, ground barley, oat middlings, salt.
Amendt Milling Co., Monroe, Mich.								
B 2798	Ameco Dairy Feed.....	Monroe... { G.* F.*	8.9	22.0 24.4	5.0 4.7	13.0 8.3	.....	Cottonseed meal, linseed meal, gluten feed, brewers grains, distillers grains, malt sprouts, wheat bran and middlings, corn feed.
B 2805	Ameco Dairy Feed.....	Trenton.....	8.8	24.8	5.9	9.2	55 00	Same as B 2798.
B 2890	Ameco Dairy Feed.....	Ypsilanti.....	8.8	24.3	6.0	10.0	62 00	Same as B 2798.
		Average.....	8.8	24.5	5.5	9.2	.....	Cottonseed meal, linseed meal, gluten feed, brewers grains, distillers grains, malt sprouts, wheat bran and middlings, corn feed.
American Milling Co., Peoria, Ill.								
B 1913	Ameco Dairy Feed.....	Detroit... { G.* F.*	9.5	25.0 24.4	8.0 6.4	16.0 14.6	2 75	Cottonseed meal, gluten feed, corn distillers grains, screenings, salt.
B 1989	Ameco Dairy Feed.....	Morenci.....	7.2	29.1	6.6	8.1	56 00	Gluten feed, distillers' grains, oat hulls, clipped oat by-product, salt.
B 2492	Ameco Dairy Feed.....	Grand Rapids.....	8.5	26.1	5.7	16.9	62 00	Brewers grains, corn distillers grains, oat hulls, salt.
B 2536	Ameco Dairy Feed.....	Grandville.....	8.3	25.8	5.8	13.1	54 00	Cottonseed meal, gluten feed, corn distillers grains, oat clippings, palm kernel meal, wheat (trace), salt.
		Average.....	8.4	26.4	6.1	13.2	.....	Cottonseed meal, corn gluten feed, oat shorts.
B 1911	Ameco Stock Feed.....	Detroit... { G.* F.*	10.0	10.0 12.6	3.5 5.3	9.0 16.7	2 50	Distillers grains.
B 1963	Empire State Dairy Feed.....	Morenci... { G.* F.*	7.7	30.0 30.0	10.0 11.2	14.0 12.2	59 00	Distillers grains.
Arady Farms Milling Co., Chicago, Ill.								
B 2545	Arady Certified Dairy Feed.....	Jamestown... { G.* F.*	9.3	25.0 26.7	4.5 5.0	12.0 12.1	55 00	Cottonseed meal, linseed meal, gluten feed, brewers grains, malt sprouts, wheat bran and middlings, corn feed meal, ground oats, corn oil cake meal, salt.
B 3148	Arady Certified Dairy Feed.....	Berlin.....	9.0	22.4	5.7	13.9	63 00	Same as B 2545.
		Average.....	9.5	24.6	5.4	13.0	.....

J. J. Badenoeh Co., Chicago, Ill.		Constantine.....		{ G.* F.* }		8.0 9.9		3.0 3.9		12.0 12.2		3 25		Oat shorts, oat middlings, oat hulls, hominy feed, corn feed meal, salt.
B 3260	Badenoeh's Stock Feed.....					8.7								
Bad Axe Grain Co., Bad Axe, Mich.		Bad Axe.....		{ G.* F.* }		9.6 11.9		3.3 2.9		6.1 6.4		3 00		Wheat, oats and grain screenings.
B 2627	Axe Brand Ground Feed.....					12.2								
J. E. Bartlett Co., Jackson, Mich.		Sawdusty.....		{ G.* F.* }		25.0 24.3		7.0 5.1		10.0 10.8		2.75		Cottonseed meal, brewers' grains, wheat bran and middlings, grain screenings.
B 2647	Farmer Brand Dairy Feed.....					8.7								
Chapin & Company, Hammond, Ind.		Tecumseh.....		{ G.* F.* }		26.0 27.4		5.5 5.9		11.0 11.3		59 00		Cottonseed meal, lined meal, gluten feed, gluten meal, hominy feed, brewers' grains, corn distillers' grains, malt sprouts, wheat bran, barley feed, corn starch by-product, salt.
B 1971	Union Dairy Ration.....					8.9								Same as B 1971.
B 2485	Union Dairy Ration.....					9.0								Same as B 1971.
B 2487	Union Dairy Ration.....					8.4								Same as B 1971.
B 2473	Union Dairy Ration.....					8.3								Same as B 1971.
B 2479	Union Dairy Ration.....					8.4								Same as B 1971.
B 2733	Union Dairy Ration.....					9.4								Same as B 1971.
B 2733	Union Dairy Ration.....					9.4								Same as B 1971.
B 2744	Union Dairy Ration.....					9.5								Same as B 1971.
B 2744	Union Dairy Ration.....					9.5								Same as B 1971.
B 3016	Union Dairy Ration.....					7.9								Same as B 1971.
The Albert Dickinson Co., Chicago, Ill.		Average.....		8.8		26 4		5.8		10.1				
B 3095	Dickinson Dairy Feed.....			{ G.* F.* }		24.0		5.5		11.0				Cottonseed meal, lined meal, gluten feed, hominy feed, brewers' grains, wheat bran and middlings, salt.
B 3114	Dickinson Dairy Feed.....			{ G.* F.* }		9.0		23.8		5.1		64 00		Same as B 3095 with corn feed meal.
B 3284	Dickinson Dairy Feed.....			{ G.* F.* }		9.6		23.8		5.0		61 00		Same as B 3114.
Average.....		Average.....		9.4		23.8		5.5		10.8		2 95		
B 2645	Stag Stock Feed.....			{ G.* F.* }		9.0		3.0		12.0				Wheat middlings, oat middlings, oat shorts, oat hulls, corn feed meal, corn bran, corn screenings, barley, salt.
B 3701	Stag Stock Feed.....			{ G.* F.* }		9.8		3.3		11.6		47 50		Cottonseed meal, corn feed meal, corn bran, oat hulls, oat shorts, oat middlings.
B 3270	Stag Stock Feed.....			{ G.* F.* }		10.2		3.6		9.5		2 75		Oat shorts, oat middlings, oat hulls, ground barley, cottonseed meal, corn feed meal, corn bran, salt.
Average.....		Average.....		10.1		9.2		3.7		10.6				
B 2438	White Cross Stock Feed.....			{ G.* F.* }		10.0		3.5		10.0				Cottonseed meal, wheat, oats, corn feed meal, corn bran, salt.
B 2644	White Cross Stock Feed.....			{ G.* F.* }		11.2		4.4		6.5		68 00		Wheat middlings, oats, corn feed meal, corn bran, salt.
Average.....		Average.....		11.4		10.4		4.3		6.0				

*Abbreviations for Guaranteed and Feund.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
B 2996	Dieble Mills Company, St. Louis, Mo. Anchor Dairy Feed.....	Albion..... { G.* F.*	9.0	24.0 25.9	4.0 5.1	12.0 12.6	\$2 90	Brewers grains, alfalfa meal, wheat bran and middlings, corn feed meal, cottonseed meal, linseed meal, gluten meal, salt.
B 3313	The Farnabella Co., Inc., Detroit, Mich. Farnabella Dairy Feed.....	Detroit..... { G.* F.*	9.7	16.0 15.6	13.3 7.4	14.1 12.0	52 00	Cottonseed meal, alfalfa meal, wheat bran and middlings, ground peas, peanut hulls, grain screenings, oat hulls, corn bran.
B 2503 B 2607	Feed Products Milling Co., Chicago, Ill. Eatal Feeds Dairy Feed..... Eatal Feeds Dairy Feed.....	Grand Rapids..... { G.* F.* Holland..... 8.1	9.8 25.6 26.3	3.6 12.5 13.3	4.0 3.8 3.6	15.0 12.5 12.5	59 00 63 00	Cottonseed meal, linseed meal, gluten feed, brewers grains, malt sprouts, wheat bran, corn feed meal. Same as B 2503.
B 2658	Polo Stock Feed.....	Average..... Battle Creek..... { G.* F.*	9.0 10.8	26.0 10.5	3.7 2.5 3.3	12.9 9.0 7.4	60 00	Gluten feed, wheat bran and middlings, crushed oats, oat shorts and middlings, oat hulls, corn feed meal.
B 1975 B 2758	Hales & Edwards Co., Chicago, Ill. Golden Flake Dairy Feed..... Pioneer Stock Feed.....	Clinton..... { G.* F.* Lansing..... 11.5	16.0 17.0 10.0	3.5 2.8 2.5	15.0 13.9 9.0	..... ..... 3 50	..... ..... 3 50	Cottonseed meal, linseed meal, gluten feed, gluten feed, by-product, screenings, salt. Corn feed meal, oat middlings, oat shorts, oat hulls, crushed oats, gluten feed, wheat bran and middlings. Same as B 2758.
B 2760 B 3215	Pioneer Stock Feed..... Pioneer Stock Feed.....	Lansing..... Homer..... 11.6	11.8 12.6 12.8	3.3 3.6 3.6	7.4 7.7 7.7	3 50 3 50	..... ..... 3 50	Same as B 2758.
B 1974 B 2658 B 2664	Red Horn Dairy Feed..... Red Horn Dairy Feed..... Red Horn Dairy Feed.....	Average..... Clinton..... { G.* F.* Holland..... 9.2	11.6 25.0 26.0 26.5	12.8 4.0 3.9 4.8	3.5 4.0 12.1 11.6	7.8 15.0 12.7	..... ..... 60 00 57 00	Cottonseed meal, linseed meal, gluten feed, brewers grains, malt sprouts, wheat bran, corn feed meal, salt. Same as B 1974, corn feed meal, salt. Cottonseed meal, linseed meal, brewers grains, malt sprouts, wheat bran, corn meal, grain screenings.
B 3116	Red Horn Dairy Feed.....	Petokey..... Average..... 9.1	23.9 25.9	4.2 4.3	12.5 12.2	67 00	..... ..... .....	Cottonseed meal, linseed meal, gluten feed, brewers grains, malt sprouts, alfalfa meal, wheat bran, corn feed meal.
B 2692	Interstate Feed Association, Detroit, Michigan. Mohrman Dairy Feed.....	Milford..... { G.* F.* 10.3	21.0 22.6	6.0 4.6	10.5 10.5	..... ..... .....	..... ..... .....	Distillers grains, oat shorts, oat middlings, oat hulls, corn feed meal, hominy feed, gluten feed, cottonseed meal, linseed meal, wheat bran and middlings, salt.

Chas. A. Krause Milling Co., Milwaukee, Wis.

B 3065	Badger Dairy Feed	{ G.* F.* }	19.0 21.6	3.5 3.6	15.0 13.0	58.00	Cottonteed meal, linseed meal, gluten feed, hominy feed, brewers grains, wheat bran and middlings, oat shorts, oat middlings, oat hulls, corn germ meal, salt.
B 1880	Badger Stock Feed	{ G.* F.* }	10.0 9.9	4.5 4.5	12.0 11.8	55.00	Oat shorts, oat hulls, corn feed meal.
B 2616	Badger Stock Feed	{ G.* F.* }	9.8 9.1	4.1 4.1	14.4 14.4	65.00	Wheat bran and middlings, oats, corn, grain screenings.
B 2738	Badger Stock Feed	{ G.* F.* }	8.8 9.1	3.9 3.9	14.7 14.7	3.00	Hominy feed, corn bran, oat shorts and middlings, oat hulls, corn germ meal, salt.
B 3291	Badger Stock Feed	{ G.* F.* }	9.8 10.0	3.8 3.8	14.3 14.3	2.90	Same as B 2738.
	Average		9.4	4.1	13.8		
B 2853	Cream City Dairy Feed	{ G.* F.* }	19.0 19.6	3.5 4.4	15.0 14.6	2.80	Cottonteed meal, linseed meal, gluten feed, brewers grains, wheat bran and middlings, oat shorts, oat middlings, oat hulls, salt.
B 3290	Cream City Dairy Feed	{ G.* F.* }	8.7 18.3	3.9 3.9	16.5 16.5	2.90	Same as B 3290, corn germ meal.
	Average		8.6	4.2	15.6		
B 2468	Krause Dairy Feed	{ G.* F.* }	24.0 24.8	5.0 5.1	13.0 12.8	55.00	Cottonteed meal, linseed meal, gluten feed, brewers grains, corn distillers grains, malt sprouts, wheat bran and middlings with screenings, corn germ meal, salt.
B 2474	Krause Dairy Feed	{ G.* F.* }	9.3 25.2	5.5 5.5	12.6 13.2	57.00	Same as B 2468.
B 2529	Krause Dairy Feed	{ G.* F.* }	9.6 21.7	3.9 3.9	13.2 13.2	59.00	Same as B 2468.
B 2540	Krause Dairy Feed	{ G.* F.* }	9.1 28.0	5.5 5.5	9.9 9.9	54.00	Cottonteed meal, gluten feed, brewers grains, corn distillers grains malt sprouts, wheat bran and middlings with mill run screenings, hominy feed, corn germ meal.
B 2578	Krause Dairy Feed	{ G.* F.* }	9.0 23.7	5.1 5.1	11.1 11.1	58.00	Cottonteed meal, linseed meal, gluten feed, hominy feed, brewers grains, corn distillers grains, malt sprouts, wheat bran and middlings with mill run screenings, corn germ meal, salt.
B 2738	Krause Dairy Feed	{ G.* F.* }	8.9 25.2	5.1 5.1	12.7 12.7	3.00	Same as B 2540.
B 2750	Krause Dairy Feed	{ G.* F.* }	9.3 25.2	5.5 5.5	9.3 9.3	65.00	Same as B 2540.
B 2850	Krause Dairy Feed	{ G.* F.* }	9.1 24.7	5.8 5.8	10.1 10.1	2.00	Same as B 2578, no corn germ meal nor salt.
B 2913	Krause Dairy Feed	{ G.* F.* }	13.1 24.1	5.8 5.8	11.3 11.3	2.90	Same as B 2578.
B 2918	Krause Dairy Feed	{ G.* F.* }	9.3 25.4	5.5 5.5	11.1 11.1	2.75	Same as B 2578.
B 3066	Krause Dairy Feed	{ G.* F.* }	8.8 26.1	5.6 5.6	10.3 10.3	64.00	Same as B 2578.
	Average		9.6	5.3	11.3		
B 2752	Krause Stock Feed	{ G.* F.* }	10.0 10.7	4.5 6.8	12.0 8.6	58.00	Hominy feed, corn germ meal, corn flour, oat shorts, oat middlings, oat hulls, salt.
B 2577	Krause Stock Feed	{ G.* F.* }	9.4 9.9	5.6 5.6	11.4 11.4	59.00	Hominy feed, corn germ meal, oat middlings, oat shorts, oat hulls, corn, maize red dog flour.
B 2851	Krause Stock Feed	{ G.* F.* }	8.2 8.8	6.5 6.5	11.2 11.2	2.70	Same as B 2752.
	Average		9.2	6.3	10.4		
B 2560	Pop Feed	{ G.* F.* }	10.0 10.7	3.5 4.3	16.0 12.0	65.00	Alfalfa meal, hominy feed, cracked corn, wheat, oats, oat hulls.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Laboratory number	Manufacturer and trade name	Sampled at	Moisture	Crude protein	Crude fat	Crude fiber	Price per ton or cwt.	Principal ingredients identified.
Larowe Milling Co., Detroit, Mich.								
B 1920	Larowe Feed	Detroit.....	{ G.* F.*	20.0	3.0	14.0	\$2 75	Cottonseed meal, gluten meal, corn distillers grains, dried beet pulp, wheat middlings, wheat bran and screenings, salt.
B 1981	Larowe Feed	Clinton.....	9.9	21.3	4.5	11.9	56 00	Same as B 1920.
B 2513	Larowe Feed	Grand Rapids.....	9.5	20.4	4.2	11.6	2 70	Same as B 1920.
B 2523	Larowe Feed	Grandville.....	9.5	21.3	3.6	11.5	2 70	Same as B 1920.
B 2534	Larowe Feed	Zeeland.....	10.0	22.6	4.2	11.4	55 00	Same as B 1920.
B 2553	Larowe Feed	Muskegon.....	10.1	21.6	4.2	11.6	56 00	Same as B 1920.
B 2778	Larowe Feed	Lansing.....	9.2	21.4	4.0	12.3	3 00	Same as B 1920.
	Average.....		9.7	21.4	4.2	11.7	.....
Larowe Big Six Dairy Feed								
B 1925	Larowe Big Six Dairy Feed	Detroit.....	{ G.* F.*	21.0	4.0	12.0	2 75	Cottonseed meal, linseed meal, corn gluten feed, wheat bran, wheat middlings with ground screenings, corn distillers grains, hominy feed, salt.
B 2506	Larowe Big Six Dairy Feed	Grand Rapids.....	9.8	21.3	5.4	8.2	60 00	Same as B 1925.
B 2532	Larowe Big Six Dairy Feed	Zeeland.....	9.9	20.8	5.5	8.5	58 00	Same as B 1925.
B 2706	Larowe Big Six Dairy Feed	Adrian.....	9.4	21.0	6.0	9.2	55 00	Same as B 1925.
	Average.....		9.8	21.2	5.6	8.6	.....
McMerran Milling Co., Port Huron, Mich.								
B 2640	Protean Feed	St. Clair.....	{ G.* F.*	20.0	3.0	12.0	.....	Linseed meal, gluten feed, wheat bran and middlings, pea bran, salt.
B 2648	Protean Feed	Sandusky.....	9.4	14.4	2.9	20.3	52 00	Same as B 2640.
	Average.....		9.3	12.8	2.4	25.3	2 65	Linseed meal, gluten feed, wheat bran and middlings, oats, pea bran, wheat screenings.
Omaha Alfalfa Milling Co., Omaha, Nebr.								
B 2687	Beauty Dairy Feed	Durand.....	{ G.* F.*	24.0	3.0	20.0	.....	Alfalfa meal, wheat bran, cottonseed meal, linseed meal, corn meal.
B 2686	Beauty Dairy Feed	Grand Rapids.....	9.7	20.6	3.8	15.7	58 00	Same as B 2687, salt.
	Average.....		8.9	19.7	3.8	17.4	58 00	
			9.3	20.2	3.8	16.6	.....
Park & Pollard Co., Chicago, Ill.								
B 2688	Stevens 44 Dairy Ration	Grand Rapids.....	{ G.* F.*	24.0	5.0	14.0	.....	Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers grains, distillers grains, wheat bran and middlings, buckwheat middlings, ground barley, corn meal, coconut oil meal, pea meal, corn germ meal, salt.
			10.1	23.7	6.4	9.0	63 00	

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
The Ubiko Milling Co., Cincinnati, Ohio.								
B 2793	Union Grains Bites Ready Dairy Ration.	Ann Arbor..... (G.* F.*	8.4	24.0 25.1	7.0 5.7	10.0 10.5	\$2.90	Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers grains, distillers grains, malt sprouts, wheat bran and middlings, salt.
B 2808	Union Grains Bites Ready Dairy Ration.	Ann Arbor..... Average.....	7.8	24.8	6.7	11.5	58.00	Same as B 2793.
B 2906	Wagner White Co., Jackson, Mich.	Constantine..... (G.* F.*	9.8	26.0 21.3	5.0 4.3	14.0 10.0		Hominy feed, alfalfa meal, wheat bran, ground oats, corn meal, gluten feed, cottonseed meal, linseed meal, salt.
B 3101	Wawco Dairy Feed.	Coopersville..... Average.....	9.6	26.0	6.0	10.5	60.00	Hominy feed, wheat bran, middlings, ground oats, linseed meal, gluten feed, cottonseed meal, salt.
B 3108	Golden Cream Dairy Feed.	Vriesland..... (G.* F.*	8.9	20.0 21.4	3.5 4.7	14.0 16.4	55.00	Cottonseed meal, linseed meal gluten feed, hominy feed, oat feed, wheat bran, salt.
B 3220	E. L. Wellman, Grand Rapids, Mich.	Almont..... (G.* F.*	10.5	21.0 21.9	6.0 5.1	10.5 10.9	62.00	Oat shorts, oat middlings, oat hulls, wheat bran and middlings, cottonseed meal, linseed meal, gluten feed, distillers grains, salt.
B 3240	Wellman's Qualified Dairy Feed	Mason.....	10.2	22.4	5.1	11.1	3.00	Same as B 3220 with hominy feed.
B 3304	Wellman's Qualified Dairy Feed	Leslie..... Average.....	9.4	22.4	4.9	11.3	3.00	Same as B 3240.
B 3286	Western Products Co., Hammond, Ind.	Allegan..... (G.* F.*	19.8	20.0 19.6	4.6 4.9	14.8 12.8	3.10	Clipped oat by-products, grain screenings, cottonseed meal, gluten feed, brewers grains, wheat bran, corn meal, salt.
B 1832	MOLASSES DAIRY AND STOCK FEEDS.							
B 2491	American Milling Co., Peoria, Ill.	Detroit..... (G.* F.*	8.7	10.0 16.1	3.6 3.6	12.0 11.0	2.40	Distillers grains, oats, oat hulls, corn, molasses, salt.
	Amco Fat Maker.....	Grand Rapids..... (G.* F.*	9.7	14.2	3.8	10.3	57.00	Distillers grains, oats, oat hulls, cracked corn, clipped oat by-product, molasses.
	Average.....		9.2	15.2	3.7	10.7		

B 1918 B 1928	Supreme Dairy Feed Supreme Dairy Feed	..... .....	{ G. F.	16.5 17.0 17.0	3.5 4.1 4.6	14.0 15.0 13.9	2 50 47 00	Cottonseed meal, brewers grains, molasses, alfalfa meal, oat hulls, salt.
B 2494	Supreme Dairy Feed	.....	{ G. F.	9.7 19.3	5.0 15.9	50 00		Cottonseed meal, gluten feed, distillers grains, oat hulls, molasses, ground and bolted grains, clipped oat by-product, salt.
B 2522 B 2531 B 2706 B 2781 B 2791 B 2812	Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed	..... ..... ..... ..... ..... .....	{ G. F.	8.7 16.9 9.2 18.6 8.8 18.2 9.2 17.3 9.1 19.6	3.8 3.8 4.7 14.6 4.5 15.1 3.6 15.7 4.1 18.2	55 00 47 00		Cottonseed meal, gluten feed, corn distillers grains, clipped oat by-product, grain screenings, molasses, salt.
B 2544 B 2707 B 2718 B 2749 B 2784	Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed Supreme Dairy Feed	..... ..... ..... ..... .....	{ G. F.	10.9 18.9 8.0 14.5 9.5 18.0 12.6 18.9 10.1 17.8	3.5 4.7 3.4 16.0 4.0 14.9 3.4 12.9 4.3 15.7	45 00 48 00 50 00		Same as B 2494.
B 2828	Academy Farms Milling Co., Chicago, Ill. Academy Dairy Feed Academy Dairy Feed Academy Dairy Feed Academy Dairy Feed Academy Dairy Feed	..... ..... ..... ..... ..... .....	{ G. F.	16.0 16.0 10.9 18.9 8.0 14.5 9.5 18.0 12.6 18.9 10.1 17.8	3.5 4.7 3.4 16.0 4.0 14.9 3.4 12.9 4.3 15.7	45 00 48 00 50 00		Same as B 2494 with palm kernel meal.
B 3258	Bad Axe Grain Co., Bad Axe, Mich. Molasses Feed	..... .....	{ G. F.	10.2 17.6 9.0 17.0	4.0 14.7 1.5 10.0	14 7		Same as B 2791.
B 2095 B 2728	J. E. Bartlett Co., Jackson, Mich. Farmer Brand Molasses Ration	..... .....	{ G. F.	16.0 17.6 13.2 17.6	5.5 4.3 4.3 14.5	2 30		Cottonseed meal, gluten meal, brewers grains, malt sprouts, grain screenings, oat clippings, molasses, salt, cocoa shell meal.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Hales & Edwards Co., Chicago, Ill. Greens Feed Greens Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	10.0 12.4 15.9 15.1 13.8	0.5 1.2 0.7 16.2 1.0 17.2	2 30		Same as B 2544.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Interstate Feed Association, Detroit, Mich. Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	20.0 19.7 9.6 19.5 10.6 18.3 11.5 19.2 9.5 20.4 9.7 18.8 9.5 20.6 11.3	4.5 15.0 4.9 15.2 5.5 19.8 3.8 17.1 5.4 15.3 5.3 17.0 5.5 15.8 4.3 18.9 5.4 14.8 4.7 15.9	52 00 50 00 3 00 2 65 52 00 2 75 50 00 52 00 2 70		Wheat, corn, oats, cocoa shell meal, molasses, salt.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Interstate Feed Association, Detroit, Mich. Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	20.0 19.7 9.6 19.5 10.6 18.3 11.5 19.2 9.5 20.4 9.7 18.8 9.5 20.6 11.3	4.5 15.0 4.9 15.2 5.5 19.8 3.8 17.1 5.4 15.3 5.3 17.0 5.5 15.8 4.3 18.9 5.4 14.8 4.7 15.9	52 00 50 00 3 00 2 65 52 00 2 75 50 00 52 00 2 70		Oat shorts, oat middlings, oat hulls, grain screenings, cottonseed meal, distillers grains, palm kernel meal, molasses, salt.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Interstate Feed Association, Detroit, Mich. Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	20.0 19.7 9.6 19.5 10.6 18.3 11.5 19.2 9.5 20.4 9.7 18.8 9.5 20.6 11.3	4.5 15.0 4.9 15.2 5.5 19.8 3.8 17.1 5.4 15.3 5.3 17.0 5.5 15.8 4.3 18.9 5.4 14.8 4.7 15.9	52 00 50 00 3 00 2 65 52 00 2 75 50 00 52 00 2 70		Alfalfa meal, oats, corn, molasses.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Interstate Feed Association, Detroit, Mich. Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	20.0 19.7 9.6 19.5 10.6 18.3 11.5 19.2 9.5 20.4 9.7 18.8 9.5 20.6 11.3	4.5 15.0 4.9 15.2 5.5 19.8 3.8 17.1 5.4 15.3 5.3 17.0 5.5 15.8 4.3 18.9 5.4 14.8 4.7 15.9	52 00 50 00 3 00 2 65 52 00 2 75 50 00 52 00 2 70		Alfalfa meal, molasses.
B 2656 B 2690 B 2774 B 2788 B 2810 B 2816 B 2820 B 2874 B 2839	Interstate Feed Association, Detroit, Mich. Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed Mormilk Ready Ration Dairy Feed	..... ..... ..... ..... ..... ..... ..... ..... .....	{ G. F.	20.0 19.7 9.6 19.5 10.6 18.3 11.5 19.2 9.5 20.4 9.7 18.8 9.5 20.6 11.3	4.5 15.0 4.9 15.2 5.5 19.8 3.8 17.1 5.4 15.3 5.3 17.0 5.5 15.8 4.3 18.9 5.4 14.8 4.7 15.9	52 00 50 00 3 00 2 65 52 00 2 75 50 00 52 00 2 70		Cottonseed meal, clipped oat by-product, grain screenings, molasses, salt.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number	Manufacturer and trade name.	Sampled at	Moisture	Crude protein	Crude fat	Crude fiber	Price per ton or cwt.	Principal ingredients identified
Interstate Feed Association, Detroit, Mich.—Con.								
B 2940	Mormilk Ready Ration Dairy Feed.	Gladwin	10.7	20.8	5.4	15.1	\$2.80	Same as B 2874.
B 3094	Mormilk Ready Ration Dairy Feed.	Nuskegon	9.1	18.9	5.5	18.6	56.00	Same as B 2656.
B 3122	Mormilk Ready Ration Dairy Feed.	Ithaca	10.0	19.4	4.8	14.2	50.25	Same as B 2874.
B 3155	Mormilk Ready Ration Dairy Feed.	Holland	12.7	19.9	6.0	13.4	55.00	Same as B 2656.
B 3211	Mormilk Ready Ration Dairy Feed.	Webberville	6.6	19.9	4.3	15.1	55.00	Same as B 2874.
B 3217	Mormilk Ready Ration Dairy Feed.	Fenton Rapids	10.7	20.4	5.2	15.5	53.00	Same as B 2874.
B 3222	Mormilk Ready Ration Dairy Feed.	Romeo	10.7	20.6	5.7	15.3	58.00	Same as B 2874.
B 3243	Mormilk Ready Ration Dairy Feed.	Romeo	11.4	20.1	5.4	12.5	2.85	Same as B 2874.
B 3252	Mormilk Ready Ration Dairy Feed.	Adrian	11.8	20.9	6.1	15.4	2.80	Same as B 2874.
		Average	10.3	19.8	5.2	15.6		
International Sugar Feed Co., Minneapolis, Minn.								
B 2628	International Cattle Planters Feed	Kalamazoo	{ G.* F.*	22.0 21.8	3.5 3.4	18.5 20.2	50.00	Cottonseed meal, ground cottonseed hulls, molasses, salt.
B 1070	International Special Dairy Feed	Tecumseh	{ G.* F.*	13.0 13.9	4.3 4.3	14.0 20.4	48.00	Cottonseed meal, clipped oat by-product, screenings, molasses.
B 2730	International Special Dairy Feed	Mason	{ G.* F.*	11.6 14.4	3.8 4.3	14.1 14.1	3.00	Cottonseed meal, clipped oat by-product, grain screenings, molasses.
B 2903	International Special Dairy Feed	Saline	10.2	14.9	5.3	17.5	2.50	Same as B 2730, with salt.
B 2904	International Special Dairy Feed	Albion	9.5	13.8	4.2	18.4	2.40	Same as B 2903.
B 2984	International Special Dairy Feed	Lapeer	9.7	14.3	4.6	18.5	50.00	Same as B 2903.
B 3106	International Special Dairy Feed	Jamestown	11.6	14.7	4.9	17.2	43.00	Same as B 2903.
		Average	10.5	14.3	4.5	17.7		
Chas. A. Krause Milling Co., Milwaukee, Wis.								
B 3087	Sweet Cud Dairy Feed	Otaseo	{ G.* F.*	14.0 14.1	1.2 1.5	20.0 19.7	50.00	Alfalfa meal, cottonseed meal, molasses, salt.
B 3131	Sweet Cud Dairy Feed	Jamestown	{ G.* F.*	14.1 13.0	1.5 1.6	19.7 23.9	52.00	Same as B 3087.
		Average	15.3	13.6	1.6	21.8		
Lichtenberg & Son, Detroit, Mich.								
B 1940	Faranel Dairy Feed	Detroit	{ G.* F.*	23.0 23.4	4.0 6.3	12.0 3.8	52.00	Cottonseed meal, gluten feed, brewers grains, distillers grains, malt sprouts, wheat bran, oat hulls, molasses, weed seeds.
B 2813	Faranel Dairy Feed	Vassar	{ G.* F.*	7.9 24.2	5.7 21.2	13.5 13.5	56.00	Cottonseed meal, gluten feed, brewers grains, distillers grains, malt sprouts, wheat bran, oat feed, salt, molasses.
B 2983	Faranel Dairy Feed	Flint	7.6	23.6	5.5	12.5	3.00	Same as B 2813.
B 2993	Faranel Dairy Feed	Milford	9.9	21.9	5.0	12.6	62.00	Same as B 1940.
		Average	8.7	23.3	5.6	10.6		

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Western Grain Products Co., Hammond, Indiana.								
B 2473	Hammond Dairy Feed	Grand Rapids. { G.*	16.5	3.5	12.0	.....	.....	Cottonseed meal, corn distillers grains, malt sprouts, cocoa shell meal, ground grain screenings, clipped oat by-product, cottonseed meal, malt sprouts, alfalfa meal, oat hulls, barley, cocoa shell meal, grain screenings, molasses, cottonseed meal, clipped oat by-products, oat hulls, grain screenings, cocoa shell meal, molasses, salt, produced from screenings, molasses, salt, Same as B 2615. Same as B 2684. Same as B 2615. Same as B 2615. Same as B 2615.
B 2580	Hammond Dairy Feed	Kent City. { F.*	9.1 13.8 9.8 16.5	4.1 13.8 4.9 13.8	13.8 35.00	.....	\$43.00	
B 2615	Hammond Dairy Feed	Wayland.	9.3 15.2	3.9 15.6	15.00	.....	51.00	
B 2684	Hammond Dairy Feed	Ranger.	9.3 16.7	5.4 12.7	52.00	.....	52.00	
B 2686	Hammond Dairy Feed	Hartford.	9.4 13.9	4.3 18.4	50.00	.....	50.00	
B 2677	Hammond Dairy Feed	Grand Lodge.	11.4 18.9	4.5 15.1	2.50	.....	50.00	
B 3006	Hammond Dairy Feed	Muliken.	18.3 16.1	3.0 17.7	52.00	.....	50.00	
B 3037	Hammond Dairy Feed	Big Rapids.	10.5 16.3	4.2 14.9	50.00	.....	50.00	
B 3265	Hammond Dairy Feed	Allegan.	10.2 15.8	4.4 15.6	2.60	.....	2.60	
		Average.	9.7 16.1	4.4 15.3	.....	.....	.....
HORSE FEEDS.								
J. J. Badenoch Co., Chicago, Ill.								
B 2916	Kurvek Horse Feed	Coldwater. { G.*	9.5	2.5	5.0	.....	.....	Corn, crushed oats, ground barley. Corn, oats, barley.
B 3110	Kurvek Horse Feed	Cadillac. { F.*	10.3 10.7 10.9 9.9	4.8 7.2 4.4 7.6	3.50 78.00	.....	.....
		Average.	10.6 10.3	4.6 7.6	.....	.....	.....
Albert Dickinson Co., Chicago, Ill.								
B 2665	White Cross Horse Feed	Battle Creek. { G.*	10.0 11.9	2.5 3.7	8.0 7.5	.....	65.00	Crushed oats, cracked corn.
		Average. { F.*	10.5 10.5	3.0 3.0	7.5 7.5	.....	.....
Farnabella Co., Detroit, Mich.								
B 3209	Common Sense Horse Feed	Rochester. { G.*	9.7 10.4	3.5 3.3	6.0 13.8	.....	3.40	Alfalfa meal, ground oats, corn and barley.
		Average. { F.*	10.7 10.4	3.3 3.3	6.0 13.8	.....	.....
Hales & Edwards Co., Chicago, Ill.								
B 2762	Excelsior Horse Feed	Lansing. { G.*	10.0 10.5	3.0 4.1	8.0 7.3	.....	3.75	Cracked corn, rolled oats.
B 3295	Excelsior Horse Feed	Kalamazoo. { F.*	10.3 11.3 10.4 4.6	4.1 6.3 4.6 6.3	3.75 4.00	.....	4.00	Same as B 2762.
		Average.	10.8 10.5	4.4 6.8	.....	.....	.....

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
B 2699	J. J. Badenech Co., Chicago, Ill. Gloecat Horse Feed	Greenville. { G.* P.*	11.0	10.0 11.3	2.0 3.9	12.0 7.7	\$70 00	Alfalfa meal, corn, oats, molasses.
B 1877	Albert Dickinson Co., Chicago, Ill. Hobby Horse Feed	Detroit. { G.* F.*	13.3	9.0 11.5	1.5 1.8	15.0 12.2	2 90	Alfalfa meal, oats, corn, molasses.
B 2502	Hobby Horse Feed	Grand Rapids.	14.3	11.8	2.3	12.7	62 00	Same as B 1877.
B 2552	Hobby Horse Feed	Muskegon.	14.5	12.2	1.7	13.5	60 00	Same as B 1877.
		Average.	14.0	11.8	1.9	12.8	.....
B 1906	Oasis Horse Feed	Detroit. { G.* F.*	13.2	9.0 12.6	1.5 2.8	15.0 12.5	3 25	Alfalfa meal, oats, corn, molasses, salt.
B 1953	Feed Products Milling Co., Chicago, Ill. Kingalfa Horse Feed	Detroit. { G.* F.*	8.8	10.0 13.5	2.0 2.8	15.0 11.1	2 75	Alfalfa meal, oats, molasses.
B 3318	Grain Belt Milling Co., St. Joseph, Mo. Pennant Horse and Mule Feed	Detroit. { G.* F.*	15.1	10.0 10.0	1.0 1.3	18.0 14.4	.....	Alfalfa meal, corn, oats, molasses, salt.
B 2589	Hales & Edwards Co., Chicago, Ill. Harvest Horse Feed	Holland. { G.* F.*	13.6	10.0 13.0	2.0 2.0	15.0 10.0	60 00	Alfalfa meal, corn, oats, barley, molasses.
B 2663	Harvest Horse Feed	Battle Creek.	10.0	12.2	2.6	12.8	58 00	Alfalfa meal, oats, cracked corn, molasses.
B 2757	Harvest Horse Feed	Laurens.	13.5	15.1	3.0	13.8	3 25	Alfalfa meal, oats, cracked corn, barley, molasses.
B 2761	Harvest Horse Feed	Laurens.	15.9	12.1	1.7	13.0	3 25	Same as B 2663.
		Average.	13.3	13.1	2.3	12.4	.....
B 2561	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Horse Feed	Muskegon. { G.* F.*	13.6	10.0 10.9	2.0 2.3	12.0 12.9	60 00	Alfalfa meal, oats, cracked corn, wheat screenings, molasses.
B 2776	Badger Horse Feed	Laurens.	16.2	10.8	1.8	16.0	3 60	Alfalfa meal, oats, corn, molasses, salt.
B 2924	Badger Horse Feed	Oroogo.	18.4	11.0	1.9	12.6	2 85	Same as B 2561.
B 3292	Badger Horse Feed	Oroogo.	13.4	10.3	2.2	16.1	3 25	Same as B 2776.
		Average.	15.4	10.8	2.1	13.9	.....

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Quaker Oats Co., Chicago, Ill.								
B 2908	Golden Sweet Mule Feed	Constantine { G.* F.*	8.7	9.0 10.3	2.0 1.9	15.0 19.1	\$2 90	Alfalfa meal, oat shorts, oat middlings, oat hulls, cracked corn, cottonseed meal, molasses, salt.
B 2510	Green Cross Horse Mixed Feed	Grand Rapids { G.* F.*	10.4	10.0 10.3	2.5 2.8	12.0 14.0	60 00	Cottonseed meal, alfalfa meal, cracked corn, oats, wheat, oat meal by-products, salt, molasses.
B 2575	Green Cross Horse Mixed Feed	Sparta	9.4	10.5 11.5	2.6 3.0	13.0 65 00	65 00	Cottonseed meal, alfalfa meal, corn meal, oats, oat middlings, oat hulls, molasses, salt.
B 2635	Green Cross Horse Mixed Feed	Kalamazoo	9.4	11.3	2.7	12.6	70 00	Cottonseed meal, alfalfa meal, cracked corn, oat shorts, oat hulls, crushed oats, grain screenings, molasses, salt.
Western Grain Products Co., Hammond, Indiana.								
B 2477	Calumet Alfalfa Horse Feed	Average	9.7	11.0	2.7	13.2	.....	Alfalfa meal, oats, corn, wheat, barley, molasses, salt.
B 3140	Calumet Alfalfa Horse Feed	Grand Rapids { G.* F.*	11.0 10.7	10.0 11.3 11.5	2.5 2.7 3.0	15.0 12.1 15.1	58 00 66 00	Alfalfa meal, corn, oats, linseed meal, grain screenings, molasses, salt.
POULTRY FEEDS.								
Amendt Milling Co., Monroe, Mich.								
B 2799	Amco Poultry Mash	Monroe { G.* F.*	9.9	15.5 20.1	2.5 3.6	10.0 7.9	.....	Gluten feed, meat scraps, alfalfa meal, wheat bran, wheat middlings, corn feed meal, oats (ground), charcoal, salt.
B 2891	Amco Scratch Grains	Ypsilanti { G.* F.*	12.3	9.5 10.6	2.4 3.3	4.3 3.7	4 63	Cracked corn, kafir, wheat, oat, barley, buckwheat, linseed cake, sunflower, charcoal, grit, screenings, shell.
American Milling Co., Peoria, Ill.								
B 1916	Chuck Chuck Scratch Feed	Detroit { G.* F.*	11.8	10.0 11.1	2.5 3.9	5.0 4.0	..... 4 00	Wheat, oats, corn, kafir, buckwheat, barley, sunflower, weed seeds.
B 1935	Chuck Chuck Scratch Feed	Detroit	11.4	11.4	3.1	4.2	75 00	Same as B 1916.
B 1936	Chuck Chuck Scratch Feed with Grit	Detroit	10.7	12.3	3.3	4.0	72 50	Same as B 1916 with grit.
B 2627	Chuck Chuck Scratch Feed with Grit	Kalamazoo	11.5	11.8	2.8	4.1	81 00	Same as B 1916 with grit.
B 2609	Chuck Chuck Scratch Feed with Grit	Jackson	10.8	11.0	3.8	3.2	3 70	Same as B 1916 with grit.
Bureau Pigeon Feed.								
B 3321	Bureau Pigeon Feed	Average	11.1	11.5	3.4	4.7	.....	Cracked corn, kafir, wheat, buckwheat, millet, peas, sunflower, grain screenings.
		Detroit { G.* F.*	13.0	10.0 10.3	2.5 3.0	5.0 3.7	90 00	

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
B 1930	Blatchford's Calf Meal Factory, Waukegan, Ill.							
	Blatchford's Fill the Basket Egg Mash.	Detroit..... { G.* F.*	19.0 9.7	19.0 19.6	4.0 4.9	10.0 10.2	\$3 50	Cottonseed meal, linseed meal, malt sprouts, meat scraps, bone meal, alfalfa meal, wheat flour, wheat bran and middlings, corn feed meal, blood flour, rice polish, cocoa shell meal, dried buttermilk, ground beans and peas, oatmeal, fish, unpressed flaxseed, coconut meal, locust bean meal, foinurgrass, suise, salt. Same as B 1930.
B 2490	Blatchford's Fill the Basket Egg Mash.	Grand Rapids..... Average.....	10.0 9.9	20.1 19.9	4.3 4.6	10.0 10.1	80 00	
B 1931	Blatchford's Milk Mash.	Detroit..... { G.* F.*	20.0 9.2	20.0 20.9	4.0 4.6	7.5 7.3	3 75	Cottonseed meal, linseed meal, wheat flour, blood, flaxseed, barley and malt sprouts meal, ground beans and peas, cocoa shell meal, coconut meal, dried milk, locust bean meal, suise, foinurgrass, salt, bone, corn and oatmeal, beef scraps, fish, limestone, rice polish. Same as B 1931.
B 3246	Blatchford's Milk Mash.	Adrian..... Average.....	9.3 9.3	20.2 20.6	5.8 5.2	6.7 7.3	4 00	
B 1891	Caughy Jossman, Detroit, Mich.							
	COC Scratch Feed.	Detroit..... { G.* F.*	9.5 11.7	9.5 11.6	2.5 2.5	2.5 3.8	76 00	Wheat, oats, rye, cracked corn, kafir, buckwheat, barley, peas, wild buckwheat, weed seeds.
B 1892	COC Scratch Feed.	Detroit..... Average.....	12.1 11.9	11.4 11.5	2.7 2.6	2.9 3.3	76 00	Wheat, oats, cracked corn, kafir, buckwheat, barley, millet, weed seeds, milo, grit.
B 3160	F. B. Chamberlain, St. Louis, Mo. Perfect Brand Chick Feed.	Watervliet..... { G.* F.*	9.7 9.7	10.0 13.2	2.5 3.1	5.0 4.2	6 00	Wheat, kafir, grit, charcoal, milo maize, meat, bone, weed seeds millet.
B 3280	The C. E. Conkey Co., Cleveland, Ohio. Conkey's Buttermilk Starting Food for Baby Chicks.	Tecumseh..... { G.* F.*	11.5 11.5	12.0 13.9	3.0 2.4	4.0 3.2	7 00	Wheat, wheat middlings, hulled oats, ground corn, bone meal dried buttermilk, gentian root, mustard seed.
B 3204	C. E. De Puy Co., Pontiac, Mich. Peeries Scratch Feed.	Pontiac..... { G.* F.*	13.1 13.1	10.0 10.9	2.5 3.1	2.5 3.0	4 00	Cracked corn, kafir, wheat, oats, barley, rye, sunflower, salvago grains, milo, weed seeds.

B 2002	DeRo & Co., Flint, Mich. Peninsular Scratch Feed	Flint.....	{ G. F. }	12.1	10.0	2.5	5.0	.....	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, weed seeds, grit.
				11.4	11.4	2.6	3.9	4 30	
B 3207	Albert Dickinson Co., Chicago, Ill. Globe Chick Feed with Grit.	Constantine.....	{ G. F. }	11.3	10.0	2.5	5.0	.....	Cracked corn, cracked kafir, millet, hulled oats, wheat screenings, grit.
				11.3	9.4	2.9	3.0	4 50	
B 1914	Globe Developing Feed.	Detroit.....	{ G. F. }	12.6	10.6	2.5	5.0	.....	Wheat, hulled oats, corn, kafir, buckwheat, millet, weed seeds.
				11.8	8.7	3.2	3.7	4 50	
B 3268	Globe Developing Feed with Grit.	Constantine.....	{ G. F. }	12.2	9.7	3.4	3.3	.....	Cracked corn, kafir, wheat, rye, buckwheat, hulled oats, millet, grit.
		Average.....		12.2	9.7	3.4	3.3	.....
B 1917	Globe Egg Mash.	Detroit.....	{ G. F. }	11.1	13.6	5.0	6.6	3 50	Lined meal, meat scraps, alfalfa meal, wheat bran, middlings, corn feed meal, corn bran, salt.
				11.1	13.6	5.0	6.6	3 50	Same as B 1917 with oat shorts.
B 1999	Globe Egg Mash.	Adrian.....	{ G. F. }	10.9	14.1	4.4	6.5	3 75	Same as B 1917.
				10.4	15.2	4.9	8.4	3 50	Same as B 1917.
B 1897	Globe Egg Mash.	Detroit.....	{ G. F. }	10.9	15.1	4.5	7.5	80 00	Same as B 1917.
		Muskegon Heights.....		10.9	15.1	4.5	7.5	80 00	
B 2551	Globe Egg Mash.	Average.....		10.8	14.5	4.7	7.2	.....
				10.8	14.5	4.7	7.2	.....
B 1873	Globe Pigeon Feed.	Detroit.....	{ G. F. }	12.6	11.4	3.3	4.2	4 00	Wheat, peas, buckwheat, kafir, millet, hemp, weed seeds.
				11.7	11.5	3.1	4.2	5 00	Wheat, oats, kafir, buckwheat, barley, peas, millet, hemp.
B 1898	Globe Pigeon Feed.	Detroit.....	{ G. F. }	12.2	11.5	3.2	4.2	.....
		Average.....		12.2	11.5	3.2	4.2	.....
B 1909	Globe Scratch Feed.	Detroit.....	{ G. F. }	11.6	10.0	2.5	5.0	.....	Wheat, oats, oil cake, cracked corn, kafir, barley, sunflower.
				11.6	10.0	2.5	5.0	.....	Same as B 1898.
B 1907	Globe Scratch Feed.	Detroit.....	{ G. F. }	12.1	11.3	2.5	3.6	3 90	Same as B 1898.
				12.1	11.3	2.5	3.6	3 90	Same as B 1898.
B 2551	Globe Scratch Feed.	Grand Rapids.....	{ G. F. }	11.3	10.7	2.7	3.2	80 00	Same as B 1898.
				11.3	10.7	2.7	3.2	80 00	Same as B 1898 with grit and weed seeds.
B 2024	Globe Scratch Feed.	Zeeland.....	{ G. F. }	11.3	11.3	2.6	3.2	80 00	Same as B 1898 with grit and grain screenings.
				11.3	11.3	2.6	3.2	80 00	
B 2024	Globe Scratch Feed.	Marshall.....	{ G. F. }	10.2	11.6	3.3	4.7	.....
		Average.....		11.6	11.1	2.9	3.7	.....
B 2500	Fine Tree Scratch Feed.	Grand Rapids.....	{ G. F. }	12.5	10.9	2.6	3.8	82 00	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower.
				12.5	10.9	2.6	3.8	82 00	Same as B 2500.
B 2550	Fine Tree Scratch Feed.	Pine Tree Scratch Feed.....	{ G. F. }	12.1	10.9	3.0	4.2	85 00	Same as B 2500.
				12.1	10.9	3.0	4.2	85 00	Same as B 2500.
B 2779	Fine Tree Scratch Feed.	Leaning.....	{ G. F. }	13.3	11.1	2.5	3.6	4 25	Same as B 2500.
				13.3	11.1	2.5	3.6	4 25	Same as B 2500.
B 3077	Fine Tree Scratch Feed.	Pine Tree Scratch Feed.....	{ G. F. }	13.4	10.9	3.2	4.1	70 00	Same as B 2500.
				13.4	10.9	3.2	4.1	70 00	Same as B 2500 with grit.
B 3076	Fine Tree Scratch Feed with Grit.	Grand Rapids.....	{ G. F. }	11.7	10.4	3.1	3.7	75 00	
		Average.....		12.4	10.8	3.1	3.9	.....
B 1872	Rival Scratch Feed.	Detroit.....	{ G. F. }	12.6	9.5	2.5	5.0	.....	Wheat, oats, cracked corn, kafir, buckwheat, barley.
				12.6	9.5	2.5	5.0	.....	Cracked corn, kafir, wheat, oats, barley, oil cake (trace), wild buck-
B 2570	Rival Scratch Feed.	Muskegon.....	{ G. F. }	10.7	10.4	2.2	3.9	82 00	wheat and other weed seeds.
				10.7	10.4	2.2	3.9	82 00	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—Continued.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Albert Dickinson Co., Chicago, Ill.—Con.								
B 1900	Rival Scratch Feed with grit.	Detroit.	8.6	10.4	2.3	3.8	3 85	Oats, wild buckwheat, cracked corn, kafir, barley, grit.
B 3075	Rival Scratch Feed with grit.	Grand Rapids.	12.2	10.9	3.6	3.7	73 00	Same as B 1900 with weed seeds.
	Average.		11.0	11.0	2.7	3.9	.....
B 1871	White Cross Scratch Feed.	{ G.* F.*	10.0	10.0	2.5	5.0	.....	Wheat, oats, cracked corn, kafir, barley, sunflower.
B 1912	White Cross Scratch Feed.	Detroit.	12.1	10.3	2.3	3.4	4 10	Same as B 1871 with buckwheat and weed seeds.
B 1940	White Cross Scratch Feed.	Detroit.	12.6	11.5	2.9	3.9	4 00	Same as B 1912.
B 2489	White Cross Scratch Feed.	Grand Rapids.	11.5	10.9	2.4	4.2	76 50	Same as B 1871.
B 1998	White Cross Scratch Feed with grit.	Adrian.	11.7	11.4	2.3	3.7	85 00	Wheat, oats, corn, kafir, buckwheat, barley, weed seeds, grit.
	Average.		11.0	9.5	2.4	3.0	4 05	
			11.8	10.7	2.5	3.6	.....
Fanabella Company, Detroit, Mich.								
B 1894	Fanabella Common Sense Egg Mash.	{ G.* F.*	16.0	16.0	4.0	9.0	.....	Linseed meal, alfalfa meal, wheat, wheat middlings, wheat bran, corn feed meal, kafir, charcoal, weed seeds, salt.
B 3312	Fanabella Common Sense Egg Mash.	Detroit.	10.4	16.7	4.3	10.0	70 00	Hominy feed, corn feed meal, grain screenings, peanut hulls, meat scrap, alfalfa meal, bone, wheat bran and middlings.
	Average.		9.6	16.1	7.5	11.2	70 00	
			10.0	16.4	5.9	10.8	.....
B 3311	Fanabella Common Sense Little Chick Feed.	{ G.* F.*	11.0	11.0	3.7	3.0	.....	Cracked corn, kafir, wheat, millet, weed seeds.
B 1893	Fanabella Common Sense Pigeon Feed.	Detroit.	9.8	9.8	2.3	4.1	82 00	
B 1907	Fanabella Common Sense Pigeon Feed.	{ G.* F.*	13.0	13.0	2.5	4.0	.....	Wheat, peas, milo, millet, weed seeds, kafir, buckwheat.
		Detroit.	12.0	12.4	2.2	3.2	89 00	Same as B 1893 without weed seeds.
		Detroit.	12.1	13.2	2.4	2.7	5 00	
	Average.		12.1	12.8	2.3	3.0	.....
			11.3	9.5	2.5	2.5	.....	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower, weed seeds.
B 1895	Fanabella Common Sense Scratch Feed.	{ G.* F.*	11.6	11.6	2.6	4.2	70 00	
		Detroit.	11.3	11.6	2.6	4.2	.....
Feed Products Milling Co., Chicago, Ill.								
B 2660	Golden Egg Scratch Feed.	{ G.* F.*	10.0	10.0	2.5	5.0	.....	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower.
B 2769	Golden Egg Scratch Feed.	Battle Creek.	11.4	10.9	2.9	4.2	85 00	Same as B 2660.
		Lansing.	11.7	12.2	3.3	4.5	4 25	
	Average.		11.6	11.6	3.1	4.4	.....

B 2661	Kuckoo Scratch Feed	Heles & Edwards Co., Chicago, Ill.	Battle Creek	{ G. F.°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, barley, sunflower.
B 2666	Kuckoo Scratch Feed		Holland	{ F.°	11.5	2.8	4.3	Same as B 2661 with grit and screenings.
B 2662	Kuckoo Scratch Feed with grit		Battle Creek	{ F.°	11.2	10.8	2.9	Same as B 2661 with grit.
			Average		11.2	10.8	2.6	
					11.9	10.7	2.8	
B 3154	Cackle Fine Chick Feed		Grand Rapids	{ G. F.°	9.0	2.0	7.0	Cracked corn, kafir, wheat, millet, grit.
B 3300	Cackle Fine Chick Feed		Battle Creek	{ F.°	13.6	8.6	2.5	Same as B 3154 with charcoal.
			Average		11.4	9.2	3.1	
					12.5	8.9	2.8	
B 2472	Cackle Poultry Feed		Grand Rapids	{ G. F.°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, barley, sunflower, weed seeds.
B 2770	Cackle Poultry Feed		Lausang	{ F.°	6.9	11.3	3.0	Same as B 2472 without weed seeds.
B 2648	Cackle Poultry Feed		Grand Haven	{ F.°	11.1	10.9	2.6	Same as B 2472 with grit.
B 2680	Cackle Poultry Feed		Flint	{ F.°	11.3	11.5	2.5	Same as B 2472 with grit.
			Average		11.8	11.1	2.8	
B 2555	Morning Glory Scratch Feed		Muskegon Hts.	{ G. F.°	10.3	11.2	2.7	Cracked corn, kafir, wheat, oats, barley, sunflower, millet, wild buckwheat.
B 2766	Morning Glory Scratch Feed		Lausang	{ F.°	11.2	11.8	3.4	Cracked corn, kafir, wheat, oats, barley, sunflower, wild buckwheat.
B 2769	Morning Glory Scratch Feed		Lausang	{ F.°	8.6	11.5	3.2	Cracked corn, kafir, wheat, oats, barley, sunflower, wild buckwheat and other weed seeds.
			Average		10.6	11.2	3.0	Same as B 2766 with grit.
B 1943	Red Comb Meat Mash with shell		Detroit	{ G. F.°	10.1	11.5	3.2	
B 2478	Red Comb Meat Mash with shell		Grand Rapids	{ F.°	15.0	4.0	10.0	
			Average		10.1	19.5	4.6	
					10.2	14.2	3.9	
1973	Red Comb Poultry Feed		Clinton	{ G. F.°	10.2	16.9	4.3	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.
2767	Red Comb Poultry Feed		Lausang	{ F.°	12.5	10.4	2.6	Same as B 1973.
2471	Red Comb Poultry Feed		Grand Rapids	{ F.°	11.7	11.0	2.7	Same as B 1973 with weed seeds.
2554	Red Comb Poultry Feed		Muskegon Heights	{ F.°	12.8	11.9	2.9	Same as B 2471.
B 2549	Red Comb Poultry Feed		Grand Haven	{ F.°	12.4	11.3	2.8	Same as B 1973 with grit.
			Average		11.9	11.0	2.8	
					12.3	11.1	2.8	
B 2737	International Sugar Feed Co., Minneapolis, Minn.		Mason	{ G. F.°	10.0	3.5	5.0	Corn, kafir, wheat, oats, buckwheat, barley, linseed cake, sunflower, weed seeds.
	International Poultry Feed Scratch Size			{ F.°	12.4	13.3	2.7	
							3.8	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
	Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 2480	Blue Top Scratch Feed.....	Grand Rapids..... { G° F°	11.6 11.6	10.0 12.0	2.5 2.7	5.0 3.7	\$77 00	Cracked corn, kafir, wheat, oats, buckwheat, barley, sunflower, weed seeds.
B 2558	Blue Top Scratch Feed.....	Muskogon.....	11.7	12.4	2.5	3.5	86 00	Same as B 2480.
B 2505	Blue Top Scratch Feed.....	Holland.....	11.5	10.8	3.4	4.7	81 00	Same as B 2480.
B 3213	Blue Top Scratch Feed.....	Howell.....	12.0	12.4	2.7	3.5	4 50	Same as B 2480.
B 2504	Blue Top Scratch Feed.....	Holland.....	10.9	10.4	3.1	4.6	81 00	Same as B 2480 with grit.
B 2806	Blue Top Scratch Feed.....	Greenville.....	10.2	11.3	2.2	3.4	78 00	Same as B 2480 with grit.
	Average.....	Average.....	11.3	11.6	2.8	3.9	.....
B 3103	Conservation Chick Feed.....	Holland..... { G° F°	..... 12.1	9.0 9.0	2.5 3.5	5.0 2.2	4 50	Cracked corn, kafir, millet, grit.
B 3128	Conservation Scratch Feed.....	Jamestown..... { G° F°	..... 13.0	10.0 10.0	2.5 3.8	5.0 4.9	84 00	Cracked corn, kafir, oats, buckwheat, barley, sunflower.
B 3238	Conservation Scratch Feed.....	Detroit..... { G° F°	..... 13.8	10.5 10.5	3.4 3.8	4.9 4.7	4 15	Same as B 3128 with weed seeds.
	Average.....	Average.....	13.4	10.3	3.6	4.8	.....
B 3157	Krause Chick Feed.....	Otsego..... { G° F°	..... 12.0	10.0 9.9	2.5 4.0	5.0 2.1	4 50	Cracked wheat, cracked corn, kafir, milo maize, millet, grain screenings.
B 2556	Krause Mash.....	Muskogon..... { G° F°	..... 9.9	18.0 18.3	3.5 5.8	10.0 8.9	65 00	Hominy feed, alfalfa meal, wheat bran and middlings, red dog flour, corn feed meal, corn germ meal, meat scraps, salt.
B 3003	Krause Mash.....	Zealand.....	10.3	17.1	5.2	6.4	78 00	Same as B 2556 without red dog flour and salt.
B 3324	Krause Mash.....	Detroit.....	10.6	18.5	5.1	6.7	3 40	Same as B 3003.
	Average.....	Average.....	10.3	18.0	5.4	7.3	.....
B 2021	Log Cabin Scratch Feed.....	Grand Rapids..... { G° F°	..... 12.1	10.0 11.9	2.5 3.7	6.0 4.5	80 00	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, weed seeds.
B 2900	Log Cabin Scratch Feed.....	Fenton.....	12.6	11.5	4.4	3.7	4 75	Same as B 2521 with milo maize and no weed seeds.
B 3278	Log Cabin Scratch Feed.....	Tecumseh.....	12.7	9.4	3.3	6.7	4 50	Same as B 2900.
	Average.....	Average.....	12.5	10.9	3.8	4.6	.....

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Park & Pollard Co., Chicago, Ill.—Con.								
B 1995	Lay or Bust Dry Mash.	Morenci.	9.6	16.5	4.2	9.8	\$3 75	Dried beet pulp, alfalfa meal, wheat, wheat middlings with mill run screenings, oats, corn, buckwheat, barley, fish scraps, calcium carbonate, salt.
B 2505	Lay or Bust Dry Mash.	Grand Rapids.	9.9	17.4	3.6	8.5	100 00	Alfalfa meal, wheat, wheat bran and middlings, oats, corn, kafir buckwheat, barley, fish, meat scraps, bone meal, grain screenings calcium carbonate.
B 2620	Lay or Bust Dry Mash.	Plainwell.	9.4	17.1	3.8	10.2	70 00	Alfalfa meal, wheat, wheat bran and middlings, oats, corn, kafir, buckwheat, barley, meat, bone, beet pulp, fish, calcium carbonate, salt.
B 2640	Lay or Bust Dry Mash.	Kalamazoo.	9.0	16.3	3.9	9.7	80 00	Same as B 2620 with glass.
B 2682	Lay or Bust Dry Mash.	Bangor.	9.7	17.1	4.6	9.6	75 00	Same as B 2620.
B 2886	Lay or Bust Dry Mash.	Plymouth.	9.2	20.2	4.9	9.1	4 00	Alfalfa meal, wheat bran and middlings, oats, corn, meat scraps, dried beet pulp, fish, buckwheat, bran, marl, peat, coal, glass, calcium carbonate.
B 2917	Lay or Bust Dry Mash.	Coldwater.	8.9	20.6	4.8	7.5	3 75	Alfalfa meal, ground wheat, wheat bran and middlings, oat meal, corn meal, buckwheat, barley, meat scraps, bone meal, fish, marl, glass, peat, salt.
B 2981	Lay or Bust Dry Mash.	Flint.	9.4	16.6	4.0	9.1	3 75	Alfalfa meal, wheat bran, middlings, oats, corn, kafir, buckwheat, barley, meat, bone, fish, glass, salt.
B 3001	Lay or Bust Dry Mash.	Greenville.	9.0	20.2	5.0	8.0	.....	Alfalfa meal, ground wheat, oats, corn, kafir, buckwheat, barley, wheat bran and middlings, fish, meat, bone, marl, salt, peat, glass.
B 3014	Lay or Bust Dry Mash.	Alma.	13.0	16.9	2.5	5.6	60 00	Alfalfa meal, ground wheat, oats, corn, barley, kafir, buckwheat wheat bran, grain screenings, marl, fish, salt.
B 3069	Lay or Bust Dry Mash.	Zeeland.	9.4	16.8	3.7	9.2	71 00	Same as B 3001 without glass.
B 3072	Lay or Bust Dry Mash.	Grand Rapids.	9.3	17.4	4.1	8.2	76 00	Same as B 3001.
B 3111	Lay or Bust Dry Mash.	Cadillac.	10.3	17.4	4.7	10.6	78 00	Same as B 3069 with blood.
		Average.	9.5	17.5	4.0	9.0	.....
B 1966	Red Ribbon Scratch Feed.	Tecumseh.	11.9	10.0	1.5	5.0	.....	Wheat, oats, corn, kafir, buckwheat, barley, sunflower, weed seeds.
B 1996	Red Ribbon Scratch Feed.	Morenci.	11.8	11.1	2.6	3.7	4 15	Same as B 1966 with milo.
B 2621	Red Ribbon Scratch Feed.	Plainwell.	11.8	11.7	2.8	3.9	4 50	Same as B 1996 with rye.
B 2639	Red Ribbon Scratch Feed.	Kalamazoo.	11.9	11.1	2.4	4.1	85 00	Same as B 2621.
B 2742	Red Ribbon Scratch Feed.	Leelle.	11.9	11.3	2.5	3.8	82 00	Same as B 1966 with weed seeds.
B 3068	Red Ribbon Scratch Feed.	Zeeland.	10.8	12.6	2.9	4.0	4 00	Same as B 1966.
		Average.	11.4	11.5	2.9	4.0	.....

B 1969	Screened Scratch Feed	(G° F°)	12 0	10 0	1 5	5 0	Wheat, oats, cracked corn, kafir, buckwheat, barley, milo, sunflower, weed seeds.
B 3071	Screened Scratch Feed	(G° F°)	11 5	11 3	3 7	4 4	Same as B 1969 without weed seeds.
	Average		12 1	11 9	3 3	4 2	
B 2649	Postum Cereal Co., Battle Creek, Mich. Chicken Feed	(G° F°)	11 7	8 0	1 0	15 0	Cracked corn, wheat (wheat screenings included), oats, rye, barley, weed seeds.
	Average		11 7	10 4	1 8	4 0	
B 3256	Pratt Food Co., Chicago, Ill. Pratts Baby Chick Feed	(G° F°)	11 7	12 0	2 5	3 0	Corn meal, wheat middlings, oat middlings, ground rape, millet, bone meal, soluble starch, epson salts, shell, black pepper.
B 3314	Pratts Baby Chick Feed	(G° F°)	11 0	13 0	4 4	4 2	Same as B 3256.
	Average		11 4	12 9	5 0	4 0	
B 2968	Quaker Oats Co., Chicago, Ill. American Hen Scratch Grains	(G° F°)	13 3	10 0	2 5	5 0	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, weed seeds, g.t.
B 2794	Pansey Scratch Grains	(G° F°)	10 4	10 0	2 5	5 0	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, grit, weed seeds.
B 3159	Prize Winner Chick Feed	(G° F°)	12 9	11 0	4 4	2 4	Wheat, cracked corn, kafir, charcoal, millet, oat meal, wild buckwheat, flaxseed, weed seed.
B 3167	Quaker Chick Feed	(G° F°)	12 5	10 0	2 5	5 0	Cracked wheat, cracked corn, kafir, buckwheat, oat meal, millet, flaxseed, weed seeds, grit, charcoal.
B 2969	Schumacher Little Chick Feed	(G° F°)	13 7	10 0	2 5	5 0	Cracked corn, kafir, wheat, wild buckwheat, milo, millet, weed seeds, charcoal, grit.
	Average		13 7	10 4	3 3	2 8	
B 2846	Ralston Purina Co., St. Louis, Mo. Purina Chicken Chowder	(G° F°)	10 4	19 0	4 0	9 0	Alfa meal, wheat bran, middlings, meat scraps, blood meal, linseed meal, charcoal, salt.
B 3126	Purina Chicken Chowder	(G° F°)	10 1	18 5	4 4	9 5	Linseed meal, hominy feed, meat scraps, blood meal, alfalfa meal, wheat bran, middlings, corn feed meal, ground kafir, charcoal, salt.
	Average		10 3	19 4	4 5	8 7	
B 3327	Purina Chick Feed	(G° F°)	14 4	10 0	2 5	4 0	Cracked corn, kafir, milo, wheat screenings, millet.
B 2843	Purina Scratch Feed	(G° F°)	11 2	11 4	3 6	3 5	Corn, kafir, wheat, oats, barley, buckwheat, sunflower.
B 3127	Purina Scratch Feed	(G° F°)	12 4	10 1	3 3	3 8	Same as B 2843 without oats.
	Average		11 8	10 8	3 5	3 7	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 2764	Russia Cement Co., Gloucester, Mass. Chick Chuck Concentrated Poultry Feed.	Lansing { G* F*	7.2	50.0 51.8	2.0 1.1	1.0 1.7	\$4 40	Fish.
B 2664	Saginaw Milling Co., Saginaw, Mich. Red Hen Chick Starter	Saginaw { G* F*	14.3 10.8	11.0 10.8	2.6 2.9	3.0 1.9		Cracked corn, kafir, wheat, peas, millet, weed seeds.
B 2937	Red Hen Scratch Feed.	Bay City { G* F*	9.5 13.0	9.5 10.4	2.7 2.9	3.0 3.4	4 10	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower, weed seeds, ergot.
B 2967	Red Hen Scratch Feed.	Saginaw { G* F*	14.0 12.0	10.4 11.1	2.9 2.4	3.5 2.9	4 10	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, screenings.
B 2978	Red Hen Scratch Feed.	Flint { G* F*	12.0 13.0	11.1 10.6	2.4 2.7	2.9 3.3	4 10	Same as B 2937 without ergot and with grit.
B 2966	Wolverine Scratch Feed	Average { G* F*	13.6 9.4	10.3 10.3	2.5 2.8	3.0 3.1		Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, screenings.
B 3234	Scheuren & Mok, Detroit, Mich. Eagle Scratch Feed	Detroit { G* F*	14.5 19.0	10.8 10.0	3.3 3.7	2.5 4.8	3 95	Corn, wheat, oats, barley, sunflower.
B 3235	Meat Mash.	Detroit { G* F*	11.3 17.8	17.8 4.8	4.8 9.7	9.7	3 50	Meat scraps, bone, blood, alfalfa, wheat bran and wheat middlings with mill run screenings, ground corn, salt.
B 2533	Standard Grocer & Milling Co., Holland, Mich. Standard Scratch Feed	Holland { G* F*	12.6 9.6	10.2 10.2	3.2 2.8	2.2 2.2		Wheat, oats, corn, cracked corn, barley, sunflower, oil cake meal, wheat screenings with weed seeds, grit.
B 2995	F. J. Stuart, Pontiac, Mich. Stuart's Chicken Feed	Pontiac { G* F*	14.9 9.8	8.9 8.9	3.1 3.4	3.1 2.9	4 25	Corn, wheat, oats, barley, buckwheat, sunflower, charcoal.
B 3001	Valley City Milling Co., Grand Rapids, Mich. Rowena Egg Mash	Grand Rapids { G* F*	12.0 15.0	16.3 16.3	4.0 3.0	8.9 10.0	3 45	Alfalfa meal, wheat bran, middlings, corn, feed meal, corn, bran, meat scraps, linseed meal, salt.

B 2517	Rowena Scratch Feed	{ G°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower.
B 3089	Rowena Scratch Feed	{ F°	12.8	2.6	3.9	Same as B 2517.
B 3090	Rowena Scratch Feed		12.8	3.6	4.2	Same as B 2517 with grit.
			12.3	3.2	3.7	
	Average.....		12.6	3.1	3.9	
B 2576	Perfection Chick Feed	{ G°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, millet, grit, weed seeds.
B 2511	Perfection Scratch Feed	{ F°	11.8	2.4	1.9	
B 3049	Perfection Scratch Feed		10.0	2.5	5.0	
B 3092	Perfection Scratch Feed		11.6	3.7	4.4	Cracked corn, wheat, oats, barley, grit, weed seeds.
B 3127	Perfection Scratch Feed		13.1	10.9	2.4	Same as B 2511 with buckwheat and kafir.
B 3144	Perfection Scratch Feed		10.4	3.0	4.5	Same as B 3049 without grit.
			11.9	9.8	2.5	Same as B 3049.
			8.7	1.8	6.6	Same as B 3049.
	Average.....		11.4	9.7	2.7	
B 2935	Wellman's Qualified Poultry Feed	{ G°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, barley, wild buckwheat, wheat screenings.
B 3030	Wellman's Qualified Poultry Feed	{ F°	12.8	3.6	4.0	Same as B 2935.
B 3040	Wellman's Qualified Poultry Feed		12.0	11.9	3.5	Same as B 2935.
B 3242	Wellman's Qualified Poultry Feed		12.2	3.9	4.3	Same as B 2935 with weed seeds, no screenings.
B 3295	Wellman's Qualified Poultry Feed		12.4	2.0	3.3	Same as B 3060.
B 3307	Wellman's Qualified Poultry Feed		12.0	2.8	5.1	Same as B 3060.
B 3001	Wellman's Qualified Poultry Feed		12.0	2.8	4.1	Same as B 3060 without weed seeds.
			11.8	10.7	3.9	Same as B 3060 with grit.
	Average.....		12.4	11.2	3.5	
B 3161	Wellman's Qualified Chick Feed	{ G°	10.0	2.5	5.0	Cracked wheat, cracked corn, kafir, flaxseed, milo, oat meal, wild buckwheat, weed seeds, charcoal, grit.
		{ F°	11.0	4.2	2.9	
					4 10	
B 2578	Western Grain Products Co., Hammond, Ind.	{ G°	10.0	2.5	5.0	Cracked corn, kafir, wheat, oats, barley, buckwheat, sunflower, screenings, grit.
B 2482	Hammond Scratch Feed	{ F°	10.9	2.8	5.0	
			11.5	2.9	3.3	Cracked corn, kafir, wheat, oats, barley, buckwheat, grit, weed seeds.
B 2919	Wright's Mixture	{ G°	10.0	2.5	5.0	Cracked corn, wheat, oats, barley, buckwheat, sunflower, weed seeds.
		{ F°	13.6	3.4	3.4	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and trade name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified
B 2481	Wykes & Co., Grand Rapids, Mich. Y X Poultry Feed.....	Grand Rapids..... { G* P* }	10.0 11.2	2.5 3.4	5.0 4.1	..... .....	..... \$73.00	Cracked corn, kafir, wheat, oats, barley, sunflower, wild buckwheat, weed seeds, grit.
B 2790	CORN AND OAT FEEDS. J. J. Badenech Co., Chicago, Ill. C & O Chop.....	Ann Arbor..... { G* P* }	..... 8.6	9.0 9.4	3.0 4.0	12.0 12.0	..... 3.00	Corn feed meal, oat shorts, oat middlings, oat hulls, hominy feed meal.
B 1881 B 1866	Beck Cereal Co., Detroit, Mich. Royal Chop Feed..... Royal Chop Feed.....	Detroit..... { G* P* }	..... 10.8 9.3	8.3 10.0 10.4	5.1 5.0 6.4	5.8 7.9 7.5	..... 3.10 3.05	Oat middlings, oat hulls, ground corn. Oat middlings, oat hulls, ground corn.
B 1901 B 3042 B 3212	Commercial Milling Co., Detroit, Mich. Henkel's Chop Feed..... Henkel's Chop Feed..... Henkel's Chop Feed.....	Detroit..... { G* P* }	..... 9.8 11.9 12.4	8.5 8.9 8.6 9.8	3.5 3.1 4.6 5.6	10.0 9.5 8.3 6.2	..... ..... 80.00 3.50	Oats, oat hulls, corn feed meal, wheat screenings, wheat middlings, rye, rye middlings, kafir. Corn feed meal, oat hulls, oats, oat and rye middlings, grain screenings. Oat shorts, oat hulls, oats, rye middlings, corn meal.
B 1965	H. M. Hobart & Son, Detroit, Mich. P & H Chop Feed.....	Detroit..... { G* P* }	11.3 9.7	9.1 10.6	4.4 3.1	8.0 5.2	..... 59.00	Oat middlings, oat hulls, corn feed meal.
B 1949	Lichtenberg & Son, Detroit, Mich. Lichtenberg's Chop Feed.....	Detroit..... { G* P* }	..... 9.5	8.5 10.5	4.0 5.5	8.0 6.6	..... 65.00	Hominy feed, oat hulls, corn feed meal, corn bran.
B 3236	Scheuren & Mok, Detroit, Mich. Chop Feed.....	Detroit..... { G* P* }	..... 13.3	7.6 8.3	2.2 3.3	7.2 6.1	..... 3.10	Corn meal, corn bran, whole and ground oats with mill run ground screenings.

David Stott Milling Co., Detroit, Mich.

B 1964	Winner Chop Feed	Detroit.....	{ G* F*	9.1	9.5 9.6	5.0 5.1	8.5 7.7	Oat shorts, oat hulls, corn feed meal.
Thoman Milling Co., Lansing, Mich.								
B 2956	Ground Feed	Lansing.....	{ G* F*	12.6	9.5 11.3	2.5 4.8	5.0 4.3	Wheat, oats, corn, buckwheat, barley, screenings.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.					
WHEAT BRAN.												
Bernet Craft & Kaufman Milling Co., St. Louis, Mo.												
B 2996	Wheat Bran with ground screenings not exceeding mill run.....	Pontiac..... { G° F°	11.0 15.6	14.5 15.6	4.0 4.2	9.5 9.1	\$2 25					
J. P. Burroughs & Son, Flint, Mich.												
B 2927	Choice Winter Wheat Bran ground screenings not exceeding mill run.....	Perry..... { G° F°	10.3 14.4	12.5 14.4	3.0 4.0	10.5 10.5	2 25					
B 2975	Choice Winter Wheat Bran ground screenings not exceeding mill run.....	Clio.....	11.7	14.6	3.8	9.4	40 00					
Average.....								11.0	14.5	3.9	10.0
Cannon Valley Milling Co., Minneapolis, Minn.												
B 3028	C. V. Bran with ground screenings not exceeding mill run.....	Reed City..... { G° F°	11.4 16.3	15.0 16.3	4.0 5.4	14.6 9.6	50 00					
George C. Christian, Minneapolis, Minn.												
B 1889	Jersey Wheat Bran ground screenings not exceeding mill run.....	Detroit..... { G° F°	11.4 15.1	13.0 15.1	4.0 5.1	13.0 10.7	.....				
William A. Coombs Milling Co., Coldwater, Mich.												
B 2914	Bran, ground screenings not exceeding mill run.....	Coldwater..... { G° F°	10.1 14.5	14.0 14.5	3.0 4.3	8.0 9.3	.....				
Everett-Augenbaugh & Co., Waseca, Minn.												
B 2815	E. A. Co. Wheat Bran ground screenings not exceeding mill run.....	Vassar..... { G° F°	9.1 16.7	14.0 16.7	3.0 5.3	12.0 10.7	40 00					
B 2944	E. A. Co. Wheat Bran ground screenings not exceeding mill run.....	Gladwin.....	11.6	17.0	4.9	9.4	45 00					
Average.....								10.4	16.9	5.1	10.2
J. Hale & Sons, Ionia, Mich.												
B 2495	Flake Bran ground screenings not exceeding mill run.....	Grand Rapids..... { G° F°	11.4 10.5	14.0 14.4	3.5 3.8	7.6 9.1	40 00					
B 2862	Flake Bran ground screenings not exceeding mill run.....	Jackson.....	10.5	14.4	3.8	8.5	45 00					
Average.....								10.9	14.4	3.8	8.8
W. J. Jennison Co., Minneapolis, Minn.												
B 2855	Wheat Bran ground screenings not exceeding mill run.....	Harbor Beach..... { G° F°	9.3 15.0	14.0 15.0	4.0 5.3	12.0 9.8	46 00					
The Lindsborg Milling & Elevator Co., Lindsborg, Kan.												
B 3164	Wheat Bran and screenings.....	Muskegon Hts..... { G° F°	11.7 15.9	14.5 15.9	3.5 4.1	11.0 10.0	50 00					
National Feed Co., St. Louis, Mo.												
B 2600	Wheat Bran with screenings not exceeding mill run.....	Holland..... { G° F°	9.7 14.9	14.5 14.9	4.0 4.1	10.0 10.3	45 00					
Pillsbury Flour Mills Co., Minneapolis, Minn.												
B 2694	Durum Wheat Bran with ground screenings not exceeding mill run.....	St. Joseph..... { G° F°	9.2 13.9	11.0 13.9	4.0 5.6	14.0 14.8	.....				
B 1879	Pillsbury's Wheat Bran ground screenings not exceeding mill run.....	Detroit..... { G° F°	9.4 13.9	13.0 13.9	4.0 5.8	13.0 14.9	36 00					
B 2547	Pillsbury's Wheat Bran ground screenings not exceeding mill run.....	Nunica.....	11.0	15.4	5.5	11.1	42 00					
Average.....								10.2	14.7	5.7	13.0

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
The Red Star Milling Co., Wichita, Kan.							
B 3118	Wheat Bran and screenings	Petokey { G*	9.7	14.5	3.5	10.0	.....
B 3129	Wheat Bran and screenings	Jamestown { F*	10.6	17.9	4.4	10.8	\$45.00
					4.1	10.0	48.00
	Shane Bros. & Wilson Co., Minneapolis, Minn.	Average	10.2	17.5	4.3	10.4	.....
B 2925	Clover Leaf Wheat Bran ground screenings not exceeding mill run	Owosso { G*	11.4	14.1	5.5	11.5	.....
					5.2	11.2	45.00
Sheffield King Milling Co., Minneapolis, Minn.							
B 3317	Fancy Brodflake Wheat Bran and ground screenings	Detroit { G*	10.4	13.5	3.5	12.8	.....
					5.4	11.3	41.00
Star & Crescent Milling Co., Chicago, Ill.							
B 2525	Crescent Winter Wheat Bran with ground screenings not exceeding mill run	Grandville { G*	10.7	15.0	4.0	10.0	.....
B 2527	Crescent Winter Wheat Bran with ground screenings not exceeding mill run				4.0	9.2	38.00
B 2608	Crescent Winter Wheat Bran with ground screenings not exceeding mill run	Zealand	13.3	15.0	3.9	8.9	40.00
B 2643	Crescent Winter Wheat Bran with ground screenings not exceeding mill run	Holland	10.3	14.9	4.6	9.9	46.00
B 2689	Crescent Winter Wheat Bran with ground screenings not exceeding mill run	Allegan	10.5	15.8	5.1	10.2	38.00
B 2933	Crescent Winter Wheat Bran with ground screenings not exceeding mill run	Benton Harbor	10.2	15.6	4.4	10.7	42.00
		Millington	10.2	15.3	3.8	9.0	45.00
		Average	10.9	15.1	4.3	9.7	.....
F. W. Stock & Son, Hillsdale, Mich.							
B 3265	Bran made from pure wheat with mill run screenings	Schoolcraft { G*	10.7	14.0	3.0	10.0	.....
					3.9	10.0	40.00
David Stott Milling Co., Detroit, Mich.							
B 1963	Spring Wheat Bran and wheat screenings	Detroit { G*	9.5	13.5	4.0	11.5	.....
					4.2	8.6	.....
Valley City Milling Co., Grand Rapids, Mich.							
B 2519	Farmer's Favorite Wheat Bran with ground screenings not exceeding mill run	Grand Rapids { G*	11.4	14.1	4.6	10.1	.....
B 2875	Farmer's Favorite Wheat Bran with ground screenings not exceeding mill run				4.0	9.6	42.00
B 3004	Farmer's Favorite Wheat Bran with ground screenings not exceeding mill run	Williamston	10.2	14.3	4.3	10.6	48.00
B 3041	Farmer's Favorite Wheat Bran with ground screenings not exceeding mill run	Mulliken	9.8	14.4	4.3	10.4	45.00
		Howard City	11.0	14.5	4.3	9.2	50.00
		Average	10.6	14.5	4.2	10.0	.....
B 2538	Rowena Wheat Bran with ground screenings not exceeding mill run	Zealand { G*	10.5	14.1	4.6	10.1	.....
					4.0	9.6	40.00
Voigt Milling Co., Grand Rapids, Mich.							
B 2470	Crescent Bran with ground screenings not exceeding mill run	Coopersville { G*	11.2	14.0	4.0	11.0	.....
B 2679	Crescent Bran with ground screenings not exceeding mill run				3.9	9.5	38.00
B 3038	Crescent Bran with ground screenings not exceeding mill run	Bangor	11.3	16.1	4.5	8.0	48.00
B 3046	Crescent Bran with ground screenings not exceeding mill run	Big Rapids	11.2	14.8	4.3	8.9	40.00
B 3119	Crescent Bran with ground screenings not exceeding mill run	Cedar Springs	11.8	14.6	4.1	8.7	40.00
		Rockford	9.8	15.2	4.3	10.6	42.00
		Average	11.1	15.1	4.2	9.1	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at.	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Wagner White Co., Inc., Jackson, Mich.							
B 2631	Bran with ground screenings not exceeding mill run	Kalamazoo { G* F*	9.8	14.0 15.9	4.0 4.6	11.0 11.1	34 00
B 2637	Bran with ground screenings not exceeding mill run	Kalamazoo	10.0	14.2	4.0	10.6	45 00
B 2638	Bran with ground screenings not exceeding mill run	Kalamazoo	10.1	17.6	4.0	9.0	48 00
B 2691	Bran with ground screenings not exceeding mill run	Porton Harbor	10.3	17.8	4.3	8.2	52 00
B 2732	Bran with ground screenings not exceeding mill run	Mason	10.4	17.4	4.0	9.0	45 00
B 3104	Bran with ground screenings not exceeding mill run	Coopersville	10.1	15.2	4.2	10.4	42 00
Average			10.1	16.4	4.2	9.7	
Washburn Crosby Co., Minneapolis, Minn.							
B 1959	Wheat bran with ground screenings not exceeding mill run	Detroit { G* F*	9.1	13.0 14.5	4.0 5.2	13.0 10.8	36 00
B 2611	Wheat bran with ground screenings not exceeding mill run	Holland	10.2	14.1	5.2	11.3	45 00
B 2743	Wheat bran with ground screenings not exceeding mill run	Lealie	10.4	14.8	4.3	10.1	45 00
B 2824	Wheat bran with ground screenings not exceeding mill run	Mayville	9.6	15.1	5.1	10.7	45 00
Average			9.8	14.6	5.0	10.7	
Western Flour Mills, Davenport, Iowa.							
B 2832	Black Hawk Wheat Bran ground screenings not exceeding mill run	Bad Axe { G* F*	10.4	13.3 16.4	3.0 5.4	11.3 10.3	42 00
WHEAT MIDDINGS.							
Baldwin Flour Mills, Minneapolis, Minn.							
B 3031	Wheat Shorts with ground screenings not exceeding mill run	Cadillac { G* F*	10.5	15.5 16.5	5.0 5.4	10.0 8.4	56 00
Bay State Milling Co., Winona, Minn.							
B 2724	Winona Wheat Middlings with ground screenings not exceeding mill run	North Adams { G* F*	10.8	16.0 17.4	5.0 5.7	8.0 7.3	46 00
Bernet Craft & Kaufman Milling Co., St. Louis, Mo.							
B 2997	Wheat Middlings ground screenings not exceeding mill run	Pontiac { G* F*	11.7	17.2 16.6	4.9 4.4	6.0 5.0	58 00
Big Diamond Mills Co., Minneapolis, Minn.							
B 2734	Big Diamond Wheat Standard Middlings ground screenings not exceeding mill run	Mason { G* F*	10.7	14.8 17.3	4.2 4.9	9.3 7.2	40 00
George C. Christian, Minneapolis, Minn.							
B 2011	Berkshire Wheat Flour Middlings ground screenings not exceeding mill run	Sturgis { G* F*	9.5	15.0 16.9	4.0 5.0	8.0 5.8	52 00
B 1977	Poland Wheat Standard Middlings ground screenings not exceeding mill run	Clinton { G* F*	10.6	14.0 17.2	4.0 5.4	11.0 7.1	50 00
Commercial Milling Co., Detroit, Mich.							
B 1896	Standard Wheat Middlings ground screenings not exceeding mill run	Detroit { G* F*	10.2	13.5 18.6	4.5 5.6	10.0 6.5	42 00
B 1903	Standard Wheat Middlings ground screenings not exceeding mill run	Detroit	10.3	17.4	5.6	6.7	
B 2626	Standard Wheat Middlings ground screenings not exceeding mill run	Kalamazoo	10.7	17.4	6.0	7.2	52 00
B 2637	Standard Wheat Middlings ground screenings not exceeding mill run	Port Huron	10.8	17.4	5.8	7.3	53 00
B 3224	Standard Wheat Middlings ground screenings not exceeding mill run	Detroit	11.7	14.8	5.0	8.2	2 25
Average			10.7	17.1	5.6	7.2	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at					
			Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
The Des Peres Milling Co., St. Louis, Mo.							
B 3293	Wheat Shorts with ground wheat screenings not exceeding mill run.....	Otsego..... { G* F*	11.1	15.0 16.3	3.5 5.1	12.0 7.5	..... \$2 40
Eagle Roller Mill Co., New Ulm, Minn.							
B 2836	Wheat Middlings ground screenings not exceeding mill run.....	Port Huron... { G* F*	10.4	15.0 16.3	4.0 5.0	11.0 10.0	..... 53 00
B 2951	Wheat Middlings ground screenings not exceeding mill run.....	Midland.....	11.0	16.2	5.1	9.2	2 60
B 3023	Wheat Middlings ground screenings not exceeding mill run.....	Clare.....	10.9	18.1	5.6	6.5	55 00
B 3036	Wheat Middlings ground screenings not exceeding mill run.....	Pig Rapids.....	11.3	15.7	4.9	9.5	47 00
Average.....			10.9	16.6	5.2	8.8	.....
Everett Augenbaugh Co., Waseco, Minn.							
B 2572	E. A. Co. Wheat Middlings with ground screenings not exceeding mill run.....	N. Muskegon. { G* F*	10.8	15.0 18.3	3.0 5.6	10.0 7.5	..... 50 00
Hubbard Milling Co., Mankato, Minn.							
B 2723	Standard Fine Middlings ground screenings not exceeding mill run.....	North Adams. { G* F*	10.8	16.0 17.4	5.0 6.2	11.5 9.0	..... 46 00
Kemper Mill & Elevator Co., Kansas City, Mo.							
B 2657	Wheat Middlings with ground screenings not exceeding mill run.....	Battle Creek.. { G* F*	10.6	16.0 16.8	4.0 4.5	8.0 7.2	..... 56 00
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 1979	Badger Fancy Middlings.....	Clinton..... { G* F*	10.5	12.0 13.1	4.5 7.7	7.0 4.7	..... 60 00
B 2697	Badger Fancy Middlings.....	Greenville....	10.2	13.0	7.7	3.9	56 00
B 2702	Badger Fancy Middlings.....	Adrian.....	10.3	13.1	6.3	2.9	2 75
Average.....			10.3	13.1	7.2	3.8	.....
Lyon & Greenleaf Co., Wauseon, Ohio.							
B 1983	Waseo Middlings ground screenings not exceeding mill run.....	Blissfield..... { G* F*	10.7	17.0 15.7	4.0 4.5	6.0 5.8	..... 52 00
Montana Flour Mills Co., Lewistown, Montana.							
B 2000	Monteo Wheat Middlings with ground screenings not exceeding mill run.....	Adrian..... { G* F*	10.8	15.7 19.1	4.7 5.2	9.6 7.4	..... 2 25
National Feed Co., St. Louis, Mo.							
B 3093	Wheat Middlings with ground screenings not exceeding mill run.....	Muskegon..... { G* F*	10.6	16.0 17.6	4.0 5.2	9.0 7.5	..... 62 00
B 3124	Wheat Middlings with ground screenings not exceeding mill run.....	Jamestown.....	10.8	16.9	5.6	7.2	58 00
Average.....			10.7	17.5	5.4	7.4	.....
The Northwestern Consolidated Milling Co., Minneapolis, Minn.							
B 2942	Wheat Standard Middlings ground screenings not exceeding mill run.....	Gladwin..... { G* F*	10.6	15.0 16.7	4.5 5.9	11.0 9.6	..... 50 00
Pillsbury Flour Mills, Minneapolis, Minn.							
B 2629	Standard Middlings with ground screenings not exceeding mill run.....	Kalamazoo... { G* F*	10.7	14.0 16.9	4.0 5.5	11.0 9.1	..... 52 00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Schultz Banjou & Co., Beardstown, Ill.							
B 3152	Sunbeam middlings with mill run screenings	Coopersville. { G* F*	11.7	15.0 15.6	3.5 4.7	10.0 7.2	\$53 00
Shane Bros. & Wilson Co., Minneapolis, Minn.							
B 2901	Snowball Wheat White Middlings ground screenings not exceeding mill run	Albion. { G* F*	10.1	15.0 16.3	4.5 6.3	7.0 11.0	2 75
B 2920	Snowball Wheat White Middlings ground screenings not exceeding mill run	Owosso.....	10.9	17.2	5.8	7.1	2 85
		Average.....	10.5	16.7	6.1	9.2	
B 2895	Wheat Standard Middlings with ground screenings not exceeding mill run	Milan. { G* F*	10.4	15.3 16.1	6.4 5.8	10.5 10.4	45 00
B 2922	Wheat Standard Middlings with ground screenings not exceeding mill run	Owosso.....	11.0	14.3	5.5	11.3	2 50
		Average.....	10.7	15.2	5.7	10.9	
Standar Tilton Milling Co., St. Louis, Mo.							
B 2599	Wheat Middlings with ground screenings not exceeding mill run	Holland. { G* F*	10.4	15.0 17.2	4.0 4.6	6.0 5.5	56 00
Star & Crescent Milling Co., Chicago, Ill.							
B 2756	Star Wheat Middlings ground screenings not exceeding mill run	St. Johns. { G* F*	10.9	15.0 17.7	4.0 5.2	8.0 7.5	2 50
B 2932	Star Wheat Middlings ground screenings not exceeding mill run	Millington.....	10.5	17.0	4.2	6.7	2 50
		Average.....	10.7	17.4	4.7	7.1	
Valley City Milling Co., Grand Rapids, Mich.							
B 2464	Farmer's Favorite Wheat Middlings with ground screenings not exceeding mill run	Coopersville. { G* F*	11.7	13.0 15.4	4.8 4.4	7.5 7.6	50 00
B 2518	Farmer's Favorite Wheat Middlings with ground screenings not exceeding mill run	Grand Rapids.....	11.2	15.9	4.4	7.1	53 00
		Average.....	11.5	15.7	4.4	7.4	
B 2539	Rowena Wheat Middlings with ground screenings not exceeding mill run	Zeeland. { G* F*	11.1	13.0 18.4	5.2 4.8	7.5 6.7	56 00
B 2543	Rowena Wheat Middlings with ground screenings not exceeding mill run	Holland.....	11.4	16.0	4.8	7.3	54 00
B 2579	Rowena Wheat Middlings with ground screenings not exceeding mill run	Sparta.....	10.7	15.8	4.9	5.9	57 00
B 2748	Rowena Wheat Middlings with ground screenings not exceeding mill run	St. Johns.....	10.8	15.8	4.8	7.1	2 75
		Average.....	11.0	16.5	4.8	6.8	
Voigt Milling Co., Grand Rapids, Mich.							
B 2613	Voigt Milling Co. Middlings	Moline. { G* F*	11.7	14.5 15.7	3.5 4.5	10.0 6.3	47 00
Washburn Crosby Co., Minneapolis, Minn.							
B 1954	Standard Middlings ground screenings not exceeding mill run	Detroit. { G* F*	9.0	14.0 17.3	4.0 5.7	11.0 9.1	2 25
B 2487	Standard Middlings ground screenings not exceeding mill run	Grand Rapids.....	10.9	16.5	5.0	9.5	48 00
B 2814	Standard Middlings ground screenings not exceeding mill run	Vassar.....	9.8	17.3	5.5	8.3	2 25
B 2825	Standard Middlings ground screenings not exceeding mill run	Mayville.....	9.4	16.3	5.5	9.4	2 65
		Average.....	9.8	16.9	5.4	9.1	
B 2826	Wheat Flour Middlings ground screenings not exceeding mill run	Mayville. { G* F*	9.9	15.0 18.7	4.0 6.0	8.0 6.2	2 80

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
WHEAT MIXED FEEDS.							
Huron Milling Co., Harbor Beach, Mich.							
B 2839	Jenks Wheat Mixed Feed with ground screenings not exceeding mill run	Port Huron... { G* F*	13.0 10.7	3.5 15.0	11.5 4.4	8.7	\$48 00
B 2856	Jenks Wheat Mixed Feed with ground screenings not exceeding mill run	Harbor Beach.....	10.0	14.4	3.9	8.4	.....
	Average.....		10.4	14.7	4.2	8.6	.....
Portland Milling Co., Portland, Mich.							
B 2876	Champion Mixed Feed with ground screenings not exceeding mill run	Williamston... { G* F*	13.5 10.7	3.5 15.2	8.4 4.3	7.7	.....
F. W. Stock & Son, Hillsdale, Mich.							
B 3275	Monarch Feed.....	Hillsdale... { G* F*	10.0 10.3	4.0 15.6	10.0 4.8	9.9	2 05
Washburn Crosby Co., Minneapolis, Minn.							
B 1960	Wheat Mixed Feed ground screenings not exceeding mill run	Detroit... { G* F*	14.0 9.5	4.0 17.3	10.0 5.4	6.8	2 10
WHEAT AND RYE MIXED FEEDS.							
Commercial Milling Co., Detroit, Mich.							
B 1890	Henkel's Fine White Feed.....	Detroit... { G* F*	14.0 11.4	5.0 15.4	8.5 4.8	9.0	2 50
B 1904	Henkel's Fine White Feed.....	Detroit.....	9.9	15.9	4.6	7.9	.....
B 1992	Henkel's Fine White Feed.....	Morenci.....	10.5	14.8	4.6	6.9	58 00
B 3225	Henkel's Fine White Feed.....	Detroit.....	11.4	13.9	4.9	13.1	2 50
	Average.....		10.8	15.0	4.7	9.2	.....
B. A. Eckhart Milling Co., Chicago, Ill.							
B 2604	Wheat & Rye Flour Middlings.....	Holland... { G* F*	15.0 10.6	4.0 17.6	7.0 4.8	4.8	48 00
CEREAL FOOD BY-PRODUCTS.							
J. E. Bartlett Co., Jackson, Mich.							
B 2655	Toasted Milk Nuts.....	Jackson... { G* F*	14.4 10.9	1.5 14.5	6.5 1.4	7.7	.....
B 2722	Toasted Milk Nuts.....	North Adams.....	9.8	15.9	1.5	7.4	.....
B 2865	Toasted Milk Nuts.....	Jackson.....	10.0	15.3	1.4	7.8	1 65
	Average.....		10.2	15.2	1.4	7.6	.....
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 2652	Broken Wheat Biscuit.....	Battle Creek... { G* F*	10.1 6.5	1.0 12.6	2.6 1.9	4.8	45 00
B 2653	Dried Corn Flake Feed.....	Battle Creek... { G* F*	6.9 7.3	0.2 8.5	2.1 1.6	0.4	45 00
B 2717	Dried Corn Flake Feed.....	Hudson.....	7.6	9.1	2.4	0.5	55 00
	Average.....		7.5	8.8	2.0	0.7	.....
Postum Cereal Co., Battle Creek, Mich.							
B 2669	Cereal.....	Battle Creek... { G* F*	12.0 4.5	1.7 13.0	18.0 2.6	13.4	23 00
B 2647	Cooked Corn Grits.....	Battle Creek... { G* F*	6.0 13.9	0.2 8.3	2.0 0.6	0.4	46 00
B 2651	CXX Feed.....	Battle Creek... { G* F*	15.0 6.9	2.0 18.6	26.0 4.3	20.9	23 00
B 2714	CXX Feed.....	Hudson.....	7.6	18.3	4.2	20.1	1 50
	Average.....		7.3	18.5	4.3	20.5	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1917-1918.—CONCLUDED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Postum Cereal Co., Battle Creek, Mich.—Con.							
B 2646	Flaked Corn Feed.	Battle Creek { G* F*	5.8	8.0 9.3	1.0 1.4	5.0 0.8	52 00
B 2650	Flaked Corn Offal.	Battle Creek { G* F*	12.3	5.0 8.6	0.5 1.5	2.0 0.6	50 00
B 2668	G. N. Feed.	Battle Creek { G* F*	6.7	9.0 11.6	0.5 1.4	2.5 1.5	52 00
BARLEY FEED.							
J. E. Bartlett Co., Jackson, Mich.							
B 3139	Barley Feed with ground screenings not exceeding mill run.	N. Muskegon { G* F*	9.7	5.5 8.1	2.8 2.8	25.3 24.1	54 00
Postum Cereal Co., Battle Creek, Mich.							
B 2648	Barley Bran (Hulls)	Battle Creek { G* F*	7.0	8.0 9.2	1.3 2.3	30.0 19.1	25 00
B 3000	Barley Bran (Hulls)	Pontiac	10.3	12.1	2.3	13.4	20 00
	Average		8.7	10.7	2.3	16.3	
Washburn Crosby Milling Co., Minneapolis, Minn.							
B 3123	Barley Screenings	Jamestown { G* F*	8.8	6.0 8.7	1.0 2.7	25.0 22.1	38 00
B 3261	Barley Screenings	Jackson	9.1	7.8	2.5	22.4	2 60
	Average		9.0	8.3	2.6	22.3	
RYE FEED.							
(Rye Bran & Rye Middlings with Ground Screenings.)							
Bay State Milling Co., Winona, Minn.							
B 1990	Rye Middlings	Morenci { G* F*	9.2	16.0 15.9	3.4 3.5	6.0 6.0	47 00
Hannah & Lay Co., Traverse City, Mich.							
B 3115	Rye Feed	Traverse City { G* F*	12.9	14.1 14.1	2.7 2.7	4.5 4.5	50 00
Valley City Milling Co., Grand Rapids, Mich.							
B 3073	Rowena Rye Feed	Grand Rapids { G* F*	11.4	16.0 16.1	2.8 2.9	6.3 4.7	43 00
B 3082	Rowena Rye Feed	Grand Rapids	11.7	16.1	3.1	4.8	40 00
	Average		11.6	16.1	3.0	4.8	
Voigt Milling Co., Grand Rapids, Mich.							
B 3145	Voigts Rye Feed	Hudsonville { G* F*	11.7	15.0 15.4	3.0 3.4	6.0 4.6	50 00
MISCELLANEOUS FEEDS.							
Armour Grain Co., Chicago, Ill.							
B 3166	Oat Hulls	South Haven { G* F*	8.3	5.0 5.4	2.0 1.7	30.0 15.1	35 00
Michigan Cereal Co., Port Huron, Mich.							
B 2835	Pea Bran	Port Huron { G* F*	9.1	14.0 16.1	1.0 1.4	35.0 29.5	47 00
J. E. Bartlett Co., Jackson, Mich.							
B 3263	Velvet Bean Meal	Jackson { G* F*	10.9	18.0 16.8	4.5 4.0	12.0 14.3	47 00

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDS REQUIRING NO LICENSE.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Alma Roller Mills, Alma, Mich.						
B 3012	Buckwheat Bran.....	Alma..... { G* F*	10.2	6.1	1.1	36.1	\$41 00
	Harris Milling Co., Mt. Pleasant, Mich.						
B 3019	Middlings.....	Mt. Pleasant.. { G* F*	11.0	15.3	4.4	4.8	38 00
	Russell-Miller Milling Co., Minneapolis, Minn.						
B 2921	Bran made from wheat only.....	Owosso..... { G* F*	10.7	13.0 16.9	4.0 5.6	11.0 10.1	..... 2 30
	Larrows Milling Co., Detroit, Mich.						
B 2721	Dried Beet Pulp.....	North Adams. { G* F*	8.9	8.0 8.9	0.5 0.9	20.0 19.0	..... 40 00
B 2804	Dried Beet Pulp.....	Saginaw.....	8.1	8.9	0.9	19.5	42 00
B 2941	Dried Beet Pulp.....	Gladwin.....	10.1	8.9	1.0	18.8	2 20
B 2870	Dried Beet Pulp.....	Jackson.....	8.4	9.3	0.8	18.9	2 10
		Average.....	8.9	9.0	0.9	19.1	.....
	Saginaw Milling Co., Saginaw, Mich.						
B 2974	Rye Feed.....	Clio..... { G* F*	12.4	16.3	2.8	4.4	2 75
	David Stott Milling Co., Detroit, Mich.						
B 1962	Stotts Pure Winter Wheat Bran.....	Detroit..... { G* F*	9.5	14.0 15.0	4.5 3.8	10.5 8.3	..........
	John A. Vogtmann, Bay City, Mich.						
B 2949	Wheat Middlings.....	Bay City..... { G* F*	11.5	16.4	5.1	6.6	37 00
	Watson Higgins Milling Co., Grand Rapids, Mich.						
B 3044	Wheat Bran.....	Cedar Springs { G* F*	11.5	13.3	4.4	7.6	.....
B 3050	Wheat Bran.....	Comstock Park.....	11.5	13.9	3.9	9.6	37 00
		Average.....	11.5	13.6	4.2	8.6	.....
	E. L. Wellman, Grand Rapids, Mich.						
B 3033	Middlings.....	Cadillac..... { G* F*	10.6	18.2	4.8	5.6	58 00

*Abbreviations for Guaranteed and Found.

**ANALYSES OF FEEDS SOLD IN MICHIGAN IN VIOLATION OF THE FEEDING STUFFS LAW REQUEST
FOR LICENSE REFUSED BY MANUFACTURERS.**

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Alabama Velvet Bean Mills, Georgiana, Ala.							
B 2998	Velvet Bean Feed Meal.....	Pontiac..... { G* F*	11.7	18.0 18.2	4.2 4.2	14.0 12.9	..... \$2 00
O. H. Bowen, Birmingham, Ala.							
B 3271	Velvet Bean Meal.....	White Pigeon. { G* F*	10.8	18.0 18.9	4.5 3.8	12.0 14.3	..... 48 00
B 3276	Velvet Bean Meal.....	Clinton..... { G* F*	10.9	15.4	3.7	15.5	52 00
		Average.....	10.9	18.2	3.8	14.9	.....
C. L. Campbell & Co., Little Rock, Ark.							
B 3080	Single Hump Camel Brand Cottonseed Meal.....	Grand Rapids. { G* F*	9.1	38.5 38.8	6.0 6.2	8.0 12.0	..... 60 00
B 3210	Cottonseed Meal.....	Washington. { G* F*	8.5	36.4	6.1	11.8	56 00
Commander Mill Co., Minneapolis, Minn.							
B 2860	Commander Wheat Bran ground screenings not exceeding mill run.....	Jackson..... { G* F*	10.1	14.0 14.9	4.0 5.1	11.0 10.7	..... 2 25
Albert Dickinson Co., Chicago, Ill.							
B 3158	Pine Tree Chick Feed with grit.....	Portage Centre { G* F*	11.8	10.0 8.5	2.5 2.2	5.0 1.8	..... 4 40
Hayes Grain & Commission Co., Little Rock, Ark.							
B 2885	Supreme Brand Cottonseed Meal.....	Plymouth..... { G* F*	8.9	38.6 38.7	6.0 6.9	8.0 11.4	..... 2 30
B 2897	Supreme Brand Cottonseed Meal.....	Albion.....	9.2	40.0	7.1	10.5	55 00
B 2994	Supreme Brand Cottonseed Meal.....	Milford.....	8.6	37.6	6.5	11.4	60 00
		Average.....	8.9	38.8	6.8	11.1

*Abbreviations for Guaranteed and Found.

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MICHIGAN AGRICULTURAL COLLEGE

EXPERIMENT STATION

CHEMICAL SECTION

FERTILIZER ANALYSES

BY

**ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER,
A. L. LEWIS AND M. L. GRETTEMBERGER**

**EAST LANSING, MICHIGAN
1918**

MAY 19 1919

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*Absent on leave for war service.

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. B. W. Housholder, Supt.
Grayling, Crawford County, 80 acres deeded.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.

FERTILIZER ANALYSES.

ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER,
A. L. LEWIS, M. L. GRETTEMBERGER

The inspection and analysis of commercial fertilizers, sold, offered or exposed for sale in Michigan, is made under authority of an act of the Legislature approved March 10th, 1885, and as amended during the session of 1913. The full text of the law will be sent to any person upon request.

LICENSED BRANDS

During the year 1918, thirty manufacturers and fertilizer companies licensed 323 brands for sale in the State. Attention is called to the fact that the fertilizer law covers only those materials which are sold, offered or exposed for sale within the State, the retail price of which is \$10.00 or more per ton. Manufacturers residing outside the State may ship direct to the consumer without paying the license fee, but the party making the purchase receives no protection under the law. If the sale of fertilizer to be shipped direct to the consumer is made by an agent or representative of the manufacturer while in the State, the act is considered as one of actually offering the material itself for sale, and the fertilizer then becomes subject to the requirements of the law just as surely as though the fertilizer were actually brought into the State and then sold. Consequently, an agent of a fertilizer company is technically violating the law when he solicits or accepts orders for any unlicensed fertilizer, while in the State.

COLLECTION OF SAMPLES

The collection of samples was made during the spring and fall shipping seasons by inspectors appointed by the State Board of Agriculture.

All sections of the State in which fertilizers are used to any extent, were visited and 863 samples were secured from stocks being offered for sale by dealers. For this purpose a specially constructed tube is used which permits of securing a core from the entire length of the bag. An official sample consists of the cores taken from not less than five separate sacks of the same brand. The five or more separate cores are mixed together, placed in a stout sack, tied, sealed and forwarded to the laboratory for analysis.

Much of the fertilizer used in the State is taken directly from the cars by the consumers and it is never possible for the inspectors to secure samples of all the brands registered. It sometimes happens that a manufacturer fails, for some reason or other, to sell any of a particular brand or the sales may be very light and in the latter case it is only by chance that a sample is found.

During the past year, forty-four registered brands were not found in the State. In several cases it is known that no shipments were made. It was formerly the custom, whenever we failed to find a brand on the market, to analyze the sample forwarded by the manufacturer, as required by law at the time of applying for the license. It has long been known that these samples were generally, if not always, made up in the laboratories of the companies and were not, therefore, representative of the product as put on the market. For this, and other reasons, we have discontinued this practice and in this bulletin the brands not represented by samples

are listed in their proper places but are not given a laboratory number and only the guaranteed analysis is shown.

In many cases several samples of the same brand were drawn and analyzed. This, of course, greatly increases the work in the laboratory, but it is the only way by which we can ascertain if the brands are running uniform. If only one sample were analyzed, or if several samples were taken and composited before being analyzed, variations in the composition would not be detected.

ANALYSIS OF MISCELLANEOUS SAMPLES

On account of the large amount of work involved in the inspection of fertilizers our laboratory force is kept busy constantly with samples collected by the inspectors. It is, therefore, impossible for us to give attention to miscellaneous fertilizer samples sent to us. Furthermore, unless the samples are taken in the manner previously described they will not truly represent the lot or shipment of which they were a part and the analysis of such a sample would be an injustice either to the manufacturer or purchaser.

In all cases where doubt arises as to the merits of any particular shipment, we suggest that this office be notified and an inspector will be sent to make an investigation and draw an official sample.

RESULTS OF INSPECTION

A study of the tables of analyses shows that, of the 863 samples analyzed, representing 279 brands, 187 (21.7%) are below guarantee in one or more constituent. Fifty-four (6.3%) are below guarantee in nitrogen, 5 (0.6%) are below guarantee in total phosphoric acid, 55 (6.4%) are below in available phosphoric acid and 98 (11.4%) in potash. This is a decided improvement over the showing made last year, and represents about the normal or pre-war percentage of deficiencies.

A summary of the results of the inspection is given in the following table:

FERTILIZER ANALYSES

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SUMMARY OF RESULTS OF INSPECTION

MANUFACTURER	Number of brands licensed	Number of samples analyzed	Number below guarantee in one or more ingredient	Number equal in value to guarantee	Number not within 5 per cent of value guaranteed	Number not within 10 per cent of value guaranteed	Number 5 per cent or more above value guaranteed
American Agricultural Chemical Co.....	80	221	1	221	0	0	217
Armour Fertilizer Works.....	25	72	27	61	9	5	49
R. Binder Co.....	1	0	0	0	0	0	0
E. Burton.....	1	1	1	1	0	0	1
Calumet Fertilizer Co.....	3	0	0	0	0	0	0
Darling & Company.....	11	57	27	45	9	5	32
Farmers Fertilizer Co.....	9	10	5	7	3	0	6
Federal Chemical Co.....	25	71	26	62	5	1	47
Fertile Chemical Co.....	2	4	2	1	3	2	1
Gleaner Clearing House Association.....	7	2	0	2	0	0	1
Independent Packers Fertilizer Co.....	12	30	8	21	4	1	7
International Agricultural Corporation.....	15	31	4	27	2	0	23
Jarecki Chemical Co.....	11	49	14	45	3	1	34
Michigan State Grange.....	7	10	0	10	0	0	9
National Plant Food Co.....	1	1	0	1	0	0	1
Natural Guano Co.....	1	0	0	0	0	0	0
Nitrate Agencies Co.....	1	1	0	1	0	0	0
Nu-Life Fertilizer Co.....	1	0	0	0	0	0	0
Packers Fertilizer Co.....	11	22	4	21	0	0	19
Pulverized Manure Co.....	3	2	0	2	0	0	2
Queen City Fertilizer Co.....	1	1	0	1	0	0	1
F. S. Royster Guano Co.....	15	67	13	61	4	2	47
Smith Agricultural Chemical Co.....	9	37	12	30	5	1	19
J. L. & H. Stadler Rendering & Fert. Co.....	8	17	1	17	0	0	15
N. Swarts.....	1	1	0	1	0	0	1
Swift & Company.....	24	85	34	65	13	8	37
United Chemical & Organic Products Co.....	8	23	5	23	0	0	20
Virginia-Carolina Chemical Co.....	23	27	3	24	2	1	24
Wolcott Packing Co.....	2	1	0	1	0	0	1
Wuichet Fertilizer Co.....	5	20	0	20	0	0	20
	323	863	187	771	62	27	633

A study of the above table brings out the following interesting points:

1. Eighty-nine (89) per cent of all samples analyzed were equal to the guaranteed value.
2. Seventy-three (73) per cent of all samples analyzed were 5 per cent or more above the guaranteed value.
3. Seven (7) per cent of all samples analyzed were not within 5 per cent of the guaranteed value.
4. Three (3) per cent of all samples analyzed were not within 10 per cent of the guaranteed value.

SAMPLES REQUIRING SPECIAL MENTION

Sample A-1788. *Armour's Michigan Special*, manufactured by Armour Fertilizer Works, Chicago, Illinois. This sample was drawn from stock held by L. R. Glassford, Capac. It was found to be below guarantee in potash. Objection was raised on the ground that a mistake in sampling might have been made. Another sample, A-2464, was drawn from the same shipment and the analyses of the two samples are here given for comparison.

Sample No.	Nitrogen	Phosphoric Acid			Potaash
		Total	Insoluble	Available	
A 1788	0.94%	10.60%	1.16%	9.34%	0.58%
A 2464	0.98%	10.12%	0.97%	9.15%	0.75%

Sample A-2023. *Farmers Favorite*, manufactured by Darling & Company, Chicago, Illinois. The sample was drawn from stock held by Reed & Cheney, Grand Rapids. The analysis was so different from the guarantee it was evident that a mistake had been made by the shipping department of the company. As soon as the matter was called to the attention of Darling & Company, the lot was returned to the factory. The value of the fertilizer delivered was practically equal to that guaranteed.

Sample A-2397, *Staff-O-Life*, manufactured by the Federal Chemical Company, Louisville, Kentucky. The sample was drawn from stock held by the Sioux City Seed Company, Millington. The analysis of the sample corresponds to the "Twenty-four Phosphate" fertilizer manufactured by the same company. When the matter was called to the attention of the company they admitted that a mistake must have been made by the workman in filling the sacks from the wrong pile. The value of the fertilizer delivered was greater than the one ordered.

Sample A-1902. *Penguin Ammoniated Phosphate*, manufactured by F. S. Royster Guano Company, Baltimore, Maryland. The sample was drawn from stock held by F. B. Bachelder, Clarksville. This was sold as a 2-10-0 formula, but our analysis showed it to be a 1-12-0 brand. Objection to the sample was raised by the fertilizer company and a second sample, A-1980, from the same shipment was accordingly taken. The analysis of the second sample agreed closely with the first sample. The F. S. Royster Guano Company accepted the second result as evidence of an error on their part and promptly paid Mr. Bachelder the difference between the 2-10-0 and 1-12-0 brands.

Sample A-2549. *High Grade Acid Phosphate 16%*, manufactured by F. S. Royster Guano Company. Sample was drawn at the request of C. H. Barton, Grand Ledge, who stated that it contained stones and was the cause of breaking several seed drills. Upon investigation it was found that the "stones" were untreated rock phosphate that had spilled over from an overhead carrier in the factory and owing to a breakdown this particular lot of acid phosphate was not screened before being bagged. After making an investigation, F. S. Royster Guano Company paid the damages on the broken drills and also for having the remaining lot of fertilizer screened.

LIME-FERTILE

The material is licensed by the Fertile Chemical Co., Cleveland, Ohio. The only guarantee filed with the application is for 3 00 per cent phosphoric acid.

Three samples were drawn by the inspectors, two of which were found to be more than 0.2 per cent below guarantee. The samples were also found to contain the following percentages of calcium and magnesium carbonates.

	Calcium and Magnesium Carbonates
A 2573.....	86.48%
A 2585.....	87.23%
A 2620.....	87.80%

The analytical results indicate that the material is a mixture of approximately 90 per cent pulverized limestone and 10 per cent ground raw rock phosphate.

It is claimed by the manufacturers that "Lime-Fertile" is inoculated

with "all-crop nitrogen-fixing bacteria." All three samples were referred to the Bacteriological Department for examination as to bacterial content and their report follows:

"Ashby's Nitrogen-poor Agar was used for plating the samples of 'Lime-Fertile' with the following results:

A 2585—Contained roughly an average of 510,500 bacteria per gram, only 1000 colonies of which might be designated as the nitrogen-fixing type.

A 2573—Contained an average of 5,000 bacteria per gram, none of which were *B. radicicola*.

A 2620—Contained roughly an average of 234,700 bacteria per gram, 125,000 colonies of which might be designated as the nitrogen-fixing type.

"Fertile soils contain, instead of a few hundred thousand, many million bacteria per gram, from one to several hundred thousand per gram of which are organisms of the nitrogen-fixing type. Data compiled in our own laboratory show that *poor sandy soils* having from one to five million bacteria per gram contain from 23,000 to 424,000 bacteria per gram of the nitrogen-fixing type.

"This shows that sample A-2620 of 'Lime Fertile' contained a little over half as many organisms of the nitrogen-fixing type as did the most fertile of the samples of poor sandy soil analyzed, while sample A-2585, although it had a comparatively large bacterial count, contained but very few colonies of the nitrogen-fixing type, while sample A-2573 contained none at all.

"Thus it is evident that none of these samples would add any considerable numbers of bacteria of any type, especially nitrogen-fixing bacteria, to soil."

Several misleading statements were noted on the packages of "Lime-Fertile" and also in an advertising circular put out by the company. One of the most glaring statements is the following, taken from page 4 of the circular: "What it does. Lime-Fertile does the work of a complete fertilizer plus liming. Two hundred pounds of Lime Fertile can be used instead of two hundred pounds of ordinary commercial fertilizer plus one ton of lime or two tons of ground limestone."

The only comment that is necessary is a comparison of the amounts of plant-food and lime furnished in the two cases.

200 lbs. Lime-Fertile contains				200 lbs. Commercial Fertilizer and 2 tons Limestone contain			
Nitrogen	Unavailable P_2O_5	Potash	Lime Carbonates	Nitrogen	Available P_2O_5	Potash	Lime* Carbonates
0	6 lbs.	0	180 lbs.	2 lbs.	16 lbs.	4 lbs.	3720 lbs.

*Assuming the limestone to contain 93 per cent calcium and magnesium carbonates.

Many other misleading statements were brought to the attention of the manufacturers.

COURT CASE

During the past year the first court case under the fertilizer law was successfully terminated. In the early part of May this office was notified of a product purporting to be a commercial fertilizer which was being sold throughout Lapeer county. An investigation was immediately started which disclosed that one, Richard Stafford of North Branch, Michigan, purchased a carload of pulverized limestone from the Solvay Process Co. of

Detroit. This was packed in 100 pound paper sacks and was plainly marked as pulverized limestone. The cost of the limestone was \$4.17 per ton laid down at North Branch. Mr. Stafford called it a "government fertilizer" and sold it for \$12.00 per ton, claiming it to be a lime and phosphate mixture.

An inspector from this office accompanied by Mr. L. T. Bishop, county agricultural agent of Lapeer county, called upon several men who had purchased portions of the shipment and drew an official sample.

After a chemical analysis proved it to be nothing but pulverized limestone the evidence was laid before the prosecuting attorney of Lapeer county. On June 21, 1918, a hearing was granted Mr. Stafford in the Justice court when he plead guilty to the charge. He was bound over to the Circuit court for sentence and on June 27 was fined \$200 and costs.

In justice to the Solvay Process Co., Detroit, Michigan, we wish to say they were in no way involved in the case.

FERTILIZER PRICES

The rise of commercial fertilizer prices during the past two or three years has put every consumer on his mettle to keep the cost of fertilizing down as low as possible. One means has been the curtailment, and in some cases, the abandonment of the use of potash, especially on the heavier soils and in connection with crops that are not heavy potash feeders. The increased use of acid phosphate is undoubtedly due, in part, to this same effort to reduce the ever rising costs.

The temptation to buy low grade goods which sell at a lower price per ton is strong, even under normal conditions but in these abnormal times the tendency toward the lower grade fertilizers has seemed to be greater than ever. That this practice is unwise is shown in the following discussion of unit costs of the different forms of plant-food.

The "unit" method of computing values is commonly used in the fertilizer trade and the reader should get the meaning of the term and its application clearly in mind. One unit of plant-food is understood to mean one per cent on the basis of the ton and hence represents 20 pounds; thus, if a fertilizer contains one per cent of nitrogen it is said to carry one unit of nitrogen, if two per cent then there are two units of nitrogen in the ton and similarly for the other plant-foods. A fertilizer, then, analyzing 1% nitrogen, 8% phosphoric acid and 1% potash carries one, eight and one units of the plant-foods in the order named. Knowing the ton price of a fertilizer containing but one of the plant-foods, as for instance an acid phosphate, the unit price of the particular food element is determined by dividing the ton price by the number representing the percentage.

During the past year five different grades of acid phosphate were sold in the State. Of the 18 per cent and 20 per cent grades only one or two samples were collected and consequently are not included in the discussion. Several samples of other grades were found and the average selling price and unit cost of phosphoric acid in each is shown in the following table:

UNIT COST OF PHOSPHORIC ACID

Grade	Average Retail Price	Unit Cost of Phosphoric Acid
10%.....	\$23.13	\$2.31
14%.....	25.58	1.83
16%.....	26.61	1.66

It is readily seen that as the grade or percentage of available phosphoric acid increases the cost per unit of plant-food decreases.

Assuming that \$1.66 represents the average unit cost, to the consumer, of available phosphoric acid in 16% acid phosphate during the past year, we can now determine the cost per unit of ammonia in the various grades of ammoniated phosphate. This is done by multiplying the number of units of phosphoric acid by the price per unit. This result is then subtracted from the price per ton which gives the cost of the total amount of ammonia. If now we divide this by the number of units of ammonia, we obtain the cost of ammonia per unit in that particular lot of fertilizer. As an example let us assume a 1-12-0 fertilizer selling at \$34.12 per ton. Multiply the number of units of phosphoric acid by the price per unit ($12 \times \$1.66 = \19.92) which represents the value of the available phosphoric acid. Now subtract this result from the selling price ($\$34.12 - \$19.92 = \$14.20$) and the result will be the cost of one unit of ammonia. The cost per unit of nitrogen is determined by dividing the unit cost of ammonia by the factor 0.82 ($\$14.20 \div 0.82 = \17.32).

The unit cost of ammonia in the various grades of ammoniated phosphate sold in the State during the past year is shown in the following table:

Formula	Average Retail Price per ton	Cost of Phosphoric Acid at \$1.66 per unit	Cost of Ammonia per unit	Cost of Nitrogen per unit
1-12-0.....	\$28.36	\$19.92	\$16.88	\$20.59
1-10-0.....	30.91	16.60	14.31	17.45
1-12-0.....	32.75	19.92	12.83	15.58
2-8-0.....	35.92	13.28	12.64	15.41
2-12-0.....	38.64	19.92	9.96	12.15

Some objection might be raised to this method of arriving at the unit cost of ammonia, especially in using the lowest phosphoric acid unit value for determining the cost of the phosphoric acid in the mixtures. However, the cost of manufacturing any of the various grades of ammoniated phosphate, exclusive of materials, should not be much greater than the cost of making 16% acid phosphate for the process is practically the same, except that in making ammoniated phosphate the ammonia-bearing material is mixed with the rock phosphate before the sulfuric acid is added. Whatever extra overhead expense is incurred therefor should rightly be charged up to the ammonia. On the other hand if the ammonia-phosphate mixture is made by adding an ammoniate to a ready-made acid phosphate by the dry-mix process then it would be necessary to use a 16% phosphate in most cases and the extra cost of the mixture over and above the same amount of 16% acid phosphate should be charged to the ammonia. Furthermore, it is not our purpose to attempt to show actual values but to demonstrate the difference in cost of the plant-food to the farmer between the low and high grade fertilizers. In the case of the ammoniated phosphates sold in the State during the year the difference between the cost of the ammonia in the 1½-12-0 and the 2-12-0 formulas is very marked and a glance at the above table should deter any thoughtful person from purchasing the lower grade fertilizers. We are not in any way criticising the manufacturers' prices on the lower grade formulas since, for aught we know, the retail prices that prevailed last year on these formulas may be as low as it would be possible to make them and provide a fair profit to the manufacturers. However, we do know that those farmers who purchased the lower grade

formulas paid a much higher cost per unit of plant-food than did those who bought the higher grade goods.

In arriving at the unit cost of the potash we have followed the same method as used in determining the unit cost of ammonia except that we used the phosphate-potash mixtures. There was a much smaller amount of these mixtures sold in Michigan during 1918 than of the ammoniated phosphates but the number of samples obtained were probably just as large in proportion to the amount sold so that the average retail prices should be as representative as in the case of the ammoniated phosphates.

Grade	Average Retail Price	Cost of Phosphoric Acid at \$1.66 per unit	Cost of Potash per unit
0-10-1.....	\$30.83	\$16.60	\$14.23
0-12-1.....	30.91	19.92	11.02
0-12-2.....	36.00	19.92	8.04

Here, also, we find that in the higher grade or higher analysis mixtures the cost per unit of potash is considerably lower than in the lower grade goods.

Now, if we use the lowest unit values for ammonia, phosphoric acid and potash that have been obtained in the various cases (ammonia \$9.96, phosphoric acid \$1.66, potash \$8.04) and compute the value of the various complete fertilizers we obtain some very interesting data.

Formula	Computed Value per ton	Average Retail Price per ton
1 - 8 - 5.....	\$63.44	\$60.00
2 -12 -2.....	55.92	54.00
2½ - 8 -2.....	54.26	49.00
2 - 8 -2.....	49.28	46.00
2 - 8 -1.....	41.24	40.29
1 - 8 -2.....	39.32	40.94
1 -12 -1.....	37.92	39.01
1 -10 -1.....	30.64	35.92
1 - 9 -1.....	32.91	35.73
1 - 8 -1.....	31.28	35.59
1 - 8 -1.....	26.30	36.50*
1 -10 -1.....	29.62	33.07
1 - 7 -1.....	29.62	33.86
1 -11½ -1.....	28.09	32.10

* Fall prices only.

A study of the above table shows, first, that the average retail price of the higher grade formulas was lower, in every case, than the computed value, and second, the average retail price of the lower grade formulas (those that contain one per cent or less of ammonia with a correspondingly low percentage of potash) is higher than the computed value. The difference varies from \$1.09 in the 1-12-1 formula to \$10.20 in the ½-8-1 formula. The average difference is considerable and it is evident that in buying these low grade formulas the farmer pays the fertilizer companies for a service that is of no value. This service may be accounted for by the filler that would be required to dilute the higher grades or to the cost of handling a larger amount of low grade ammoniate or potash material. Furthermore in the lower grade fertilizer the overhead expense, or cost of manufacture exclusive of materials, freight, etc., constitutes a larger percentage of the selling price than in the higher grade fertilizers, all of which accounts for the higher unit cost of the plant-food.

Once more we wish to call attention to the fact that the computed values

given in this table do not necessarily represent the true market values but in comparison with the retail prices they demonstrate that the low grade fertilizers are the most expensive. Also we make no recommendation as to the type of fertilizer one should use, this depends upon many factors which cannot be discussed here but having determined upon the type of fertilizer, be it acid phosphate or a complete fertilizer, the foregoing data demonstrate the advisability of buying the higher grade formulas. Furthermore the analytical results published in the following pages show that the higher grade complete fertilizers, as a general rule, carry a better quality of ammoniate or, in other words, the nitrogen in the higher grade complete fertilizers would, in general, be more readily available than the nitrogen of the low grade fertilizers.

In connection with the foregoing discussion it is interesting to note that a movement is on foot among the manufacturers to reduce the number of fertilizer brands and eliminate all those with less than 14 per cent of available plant-food.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid			Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
American Agricultural Chemical Co. Detroit, Mich.									
A 2014	Amo Phos Fertilizer	'G	0.92	0.45	0.36	1.65	16.40	2.96	12.00
A 2224	Amo Phos Fertilizer	'F	1.13	0.39	0.26	1.73	15.33	2.10	13.44
A 2209	Amo Phos Fertilizer	Brighton	1.09	0.45	0.23	1.77	15.10	2.02	13.08
A 2636*	Amo Phos Fertilizer	Plymouth	1.11	0.50	0.12	1.73	16.30	1.00	15.30
A 2640*	Amo Phos Fertilizer	Beech	0.96	0.52	0.33	1.81	15.35	1.16	14.19
		Av.	1.04	0.46	0.26	1.76	15.70	1.85	13.85
Beet Fertilizer 1916									
		'G	0.82	0.27	0.82	0.82	9.00	1.65	1.00
A 2195	Favorite Potash Fertilizer	'G	0.34	0.29	0.27	0.90	11.05	1.38	2.40
A 2223	Favorite Potash Fertilizer	'F	0.56	0.27	0.32	1.15	10.75	1.38	9.67
A 2426	Favorite Potash Fertilizer	Brighton	0.40	0.31	0.33	1.04	11.65	1.44	9.37
A 2578*	Favorite Potash Fertilizer	Richmond	0.54	0.24	0.22	1.00	10.70	2.00	2.16
A 2653*	Favrite Potash Fertilizer	Blissfield	0.49	0.26	0.25	1.00	11.00	2.10	2.33
		Batavia	0.47	0.27	0.28	1.02	11.03	1.65	8.90
		Av.	0.47	0.27	0.28	1.02	11.03	1.65	9.38
Fine Ground Bone									
A 1976*	Fine Ground Bone	'G	0.48	0.84	0.45	1.65	27.00		
A 2083	Fine Ground Bone	'F	0.16	0.96	0.52	1.77	30.30		
A 2435	Fine Ground Bone	Glendora	0.40	0.75	0.61	1.64	28.50		
		Almont				1.76	29.90		
		Av.	0.35	0.85	0.52	1.72	29.57		
Michigan Bean Grower 1916									
		'G				1.65			1.00
A 2600*	Nitrate of Soda	'F				16.00			
		Marshall				15.28			
N. Y. State Special 1916									
A 2329	N. Y. State Special 1916	'G	0.29	0.33	0.42	0.82	11.90	1.30	8.00
A 2424	N. Y. State Special 1916	'F	0.46	0.28	0.31	1.04	11.80	1.76	10.60
A 2565*	N. Y. State Special 1916	Willis	0.46	0.22	0.29	0.97	11.55	2.16	10.04
		Av.	0.40	0.28	0.35	1.03	11.75	1.74	9.39
1 and 10 Compound									
A 1759	1 and 10 Compound	'G	0.41	0.27	0.34	0.82	13.45	2.38	10.00
A 1777	1 and 10 Compound	'F	0.46	0.28	0.33	1.02	13.30	1.76	11.07
A 1941*	1 and 10 Compound	Bad Axe	0.48	0.24	0.29	1.01	13.55	2.18	11.54
A 2030	1 and 10 Compound	Millington	0.51	0.25	0.25	1.01	13.40	2.02	11.37
A 2192	1 and 10 Compound	Prenbale	0.50	0.23	0.28	1.01	13.60	2.31	11.38
A 2208	1 and 10 Compound	Itasca	0.51	0.28	0.31	1.10	14.05	2.10	11.26
A 2268	1 and 10 Compound	Beech	0.51	0.28	0.31	1.10	14.05	2.10	11.26
A 2580*	1 and 10 Compound	Blissfield	0.41	0.21	0.33	0.95	13.20	1.00	12.20

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A 2007* A 2014*	1 and 10 Compound 1 and 10 Compound	Carleton..... Beech.....	0.50 0.52	0.24 0.23	0.31 0.30	1.05 1.03	13.25 13.80	1.90 2.28	11.35 11.52
A 1760 A 2191	Bradley's Brands Acid Phosphate Acid Phosphate	Av. 'G 'F Ruth..... Ithaca.....	0.48	0.25	0.30	1.03	13.51	2.00	11.51	.....
A 1761 A 2193 A 2226 A 2561* A 2566*	16% Acid Phosphate 16% Acid Phosphate 16% Acid Phosphate 16% Acid Phosphate 16% Acid Phosphate	Av. 'G 'F Ruth..... Brighton..... Milan..... Willis.....	.....	.....	.....	.....	15.00	0.92	14.08	.....
A 2510	All Crops Fertilizer.....	Av. 'G 'F Farmington.....	.....	.....	.....	.....	20.20	1.52	16.00	.....
A 2131 A 2351	B. D. Sea Fowl Guano 1918..... B. D. Sea Fowl Guano 1918.....	'G 'F Galesburg..... Adrian.....	0.70 1.24	0.60 0.65	0.51 0.36	1.65 1.81 2.25	11.45 11.90	2.26 2.24	8.00 9.60	.....
A 2113 A 2225	B. D. Sea Fowl Guano with Potash..... Dissolved Bone Phosphate with Potash 1910.....	Av. 'G 'F Brighton.....	0.07 0.73	0.03 0.51	0.43 0.49	2.03 1.65 1.73	11.68	2.25	9.43	.....
A 2114 A 2352 A 2395 A 2584* A 2636*	Niagara Phosphate..... Niagara Phosphate..... Niagara Phosphate..... Niagara Phosphate..... Niagara Phosphate.....	'G 'F Kalamazoo..... Adrian..... Nillington..... Claxton..... Carleton.....	0.56 0.52 0.63 0.53 0.45	0.21 0.23 0.16 0.19 0.26	0.21 0.19 0.21 0.20	0.82 0.98 0.94 0.98 0.91	9.85 9.50 9.50 9.05 9.35	0.78 0.76 1.14 0.46 1.48	7.00 8.07 8.74 8.36 7.87	.....
A 2029 A 2130 A 2196 A 2242 A 2247	Soluble Dissolved Bone Phosphate..... Soluble Dissolved Bone Phosphate..... Soluble Dissolved Bone Phosphate..... Soluble Dissolved Bone Phosphate..... Soluble Dissolved Bone Phosphate.....	Av. 'G 'F Drenthe..... Galesburg..... Ithaca..... Milan..... Swarts Creek.....	.....	.....	.....	.....	17.65	2.08	14.00	.....
A 2139 A 2191	Special Potash Fertilizer 1910..... Special Potash Fertilizer 1910.....	Av. 'G 'F Galesburg..... Ithaca.....	0.58 0.54	0.24 0.19	0.35 0.26	0.82 1.07 0.98	11.60	1.64	8.00	.....
		Av.	0.36	0.09	0.24	1.03	11.65	1.51	10.14	1.28

*Full Samples.
Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	Active Insoluble Organic	Inactive Insoluble Organic	Total	Total	Insoluble	Available	Total
Crocker's Brands										
A 2428	10% Acid Phosphate.....	Richmond					14.89	1.12	10.00 13.68	
A 2210	Ammoniated Wheat and Corn Phos 1916.	Beech	0.73	0.66	0.45	1.65	11.80	1.90	8.00	1.00
A 2311	Ammoniated Wheat and Corn Phos 1916.	Batavia	0.66	0.63	0.18	1.77	11.15	2.99	9.90	1.21
		Av.	0.70	0.65	0.46	1.81	11.48	1.95	9.53	1.22
A 1832	Ammoniated Wheat and Corn Phos. No. 2	Coral	0.79	0.82	0.37	1.65	12.85	3.02	8.00	
	Bean Grower.....					1.98			9.83	
A 2655*	Complete Fertilizer.....	Detroit	0.60	0.11	0.23	0.82	13.15	1.32	8.00	1.00
A 1762	Dissolved Bone Phosphate.....	Ruth				0.91			10.00	1.00
A 1958*	Dissolved Bone Phosphate.....	Crosswell				0.91			11.83	1.27
A 2016	Dissolved Bone Phosphate.....	Fremont					18.00	1.32	14.00	
							16.50	0.30	16.68	
							17.40	1.98	10.20	
		Av.					17.30	1.20	15.42	
A 2429	General Crop Phosphate.....	Richmond	0.50	0.23	0.21	0.82	9.55	0.84	7.00	1.00
						0.91			8.71	1.12
A 2015	High Grade Phosphate.....	Fremont					19.60	1.94	16.00	
A 2211	High Grade Phosphate.....	Beech					19.40	1.06	17.66	
A 2317	High Grade Phosphate.....	St. Clair					18.74	1.08	18.34	
		Av.					19.25	1.36	17.66	
A 2443	New Rival Ammoniated Superphos. 1916.	Elba	0.57	0.20	0.28	0.82	13.10	1.50	9.00	1.00
A 2608*	New Rival Ammoniated Superphos. 1916.	Carleton	0.54	0.20	0.23	0.97	12.55	2.38	11.60	1.28
		Av.	0.56	0.20	0.26	1.01	12.83	1.94	10.89	1.27
A 2270	Sugar Beet Fertilizer.....	Carleton	0.51	0.27	0.29	0.82	10.75	1.12	9.00	1.00
						1.07			9.63	1.40
A 1776	Universal Grain Grower 1916.	Rad Axe	0.43	0.23	0.38	0.82	10.75	1.20	8.00	1.00
A 2312	Universal Grain Grower 1916.	Batavia	0.42	0.20	0.30	1.01	11.65	1.01	9.65	1.21
A 2570*	Universal Grain Grower 1916.	Blossfield	0.41	0.16	0.35	1.07	10.30	1.40	10.01	1.28
		Av.	0.44	0.24	0.36	1.02	10.70	1.29	8.84	1.04

FERTILIZER ANALYSES

[illegible]

* Full Name.
Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918. EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
Michigan Carbon Works Brand—Cont.										
A 1809	Triaton Fertilizer	Covert	1.16	0.41	0.27	1.65	15.60	2.22	12.00	.....
A 1912	Triaton Fertilizer	Caro	1.16	0.58	0.17	1.84	15.85	1.98	13.38	.....
A 2044	Triaton Fertilizer	Ross	0.96	0.40	0.30	1.66	15.35	2.36	13.87	.....
A 2137	Triaton Fertilizer	Hastings	1.21	0.39	0.31	1.91	15.33	2.46	12.99	.....
A 2298	Triaton Fertilizer	Belleville	1.10	0.40	0.26	1.76	15.37	2.24	12.87	.....
A 2458	Triaton Fertilizer	Holt	1.00	0.58	0.40	1.98	16.64	2.20	13.13	.....
A 2571	Triaton Fertilizer	Azalia	1.15	0.38	0.35	1.88	16.45	1.92	14.44	.....
		Av.	1.11	0.45	0.29	1.85	15.79	2.19	13.60	.....
A 2181	Usmore Fertilizer	Middleton	.....	.....	.....	.....	14.15	0.70	12.00	1.00
A 2423	Usmore Fertilizer	Richmond	.....	.....	.....	.....	12.90	0.60	12.30	1.44
		Av.	.....	.....	.....	.....	13.53	0.65	12.88	1.18
A 1960	Wolverine Phosphate	Silverwood	.....	.....	.....	.....	12.10	0.86	10.00	.....
A 2136	Wolverine Phosphate	Hastings	.....	.....	.....	.....	11.75	1.12	11.24	.....
A 2271	Wolverine Phosphate	Culleton	.....	.....	.....	.....	12.92	1.04	10.63	.....
		Av.	.....	.....	.....	.....	12.26	1.01	11.25	.....
Michigan Carbon Works Homestead Brands										
	Bean Fertilizer 1916	.....	.....	.....	.....	1.65	.....	.....	8.00	1.00
A 1808	Bialdo Fertilizer	Covert	0.52	0.26	0.25	0.82	13.50	.....	10.00	1.00
A 2087	Bialdo Fertilizer	Glendora	0.41	0.20	0.32	1.03	13.85	1.32	12.18	1.22
A 2199	Bialdo Fertilizer	St. Louis	0.53	0.16	0.26	0.93	13.10	1.54	12.31	1.33
A 2342	Bialdo Fertilizer	Hillsdale	0.71	0.15	0.22	0.95	13.70	1.16	11.94	1.40
A 2460	Bialdo Fertilizer	Holt	0.43	0.25	0.29	1.08	13.70	1.52	12.18	1.58
		Av.	0.52	0.20	0.27	0.97	13.32	1.24	12.08	1.40
		Av.	.....	.....	.....	.....	13.49	1.36	12.13	1.30
A 2090	Bone Black Fertilizer 1918	Glendora	0.52	0.07	0.51	1.10	11.00	.....	8.00	.....
A 2398	Bone Black Fertilizer 1918	Lawrence	1.23	0.64	0.20	2.06	12.35	2.70	9.20	.....
A 2318	Bone Black Fertilizer 1918	Jonesville	1.06	0.52	0.37	1.95	11.85	2.28	10.07	.....
A 2372	Bone Black Fertilizer 1918	Morrcet	1.07	0.50	0.33	1.99	12.15	2.26	10.57
		Av.	0.97	0.58	0.35	1.93	12.06	2.13	9.03

FERTILIZER ANALYSES

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A 2079	Bone Black Fertilizer with Potash.....	'Q	0.67	0.04	0.56	1.66	10.70	1.84	8.00	1.00
A 2135	Bone Black Fertilizer with Potash.....	'F	0.55	0.07	0.44	1.87	11.60	1.84	8.86	1.32
A 2461	Bone Black Fertilizer with Potash.....		1.56	0.07	0.20	1.60	10.84	0.30	10.64	1.14
		Av.	0.93	0.46	0.40	1.70	11.05	1.38	9.67	1.24
A 2565	Bone Black Sugar Beet Fertilizer.....	'Q	0.55	0.17	0.30	0.86	11.52	1.02	9.00	1.00
		'F				1.03			10.50	1.03
A 2431	Special Potash Fertilizer.....	'Q	0.35	0.24	0.35	0.86	10.40	1.18	8.00	9.00
A 2439	Special Potash Fertilizer.....	'F	0.38	0.20	0.42	0.94	11.20	1.30	9.72	2.41
		Av.	0.37	0.22	0.39	0.97	11.05	1.24	9.81	2.31
A 2371	Sugar Beet Fertilizer 1916.....	'Q	0.42	0.22	0.31	0.86	11.80	1.20	9.00	1.00
A 2410	Sugar Beet Fertilizer 1916.....	'F	0.50	0.21	0.20	0.95	12.15	1.70	10.54	1.60
						1.00			10.45	1.14
A 2502	Acid Phosphate 10%.....	Av.	0.46	0.22	0.30	0.98	11.98	1.48	10.50	1.07
	Bean Grower.....	'Q					12.25	0.92	10.00	
		'F							11.33	
A 1796	Crown Phosphate and Potash.....	'Q				1.05			8.00	1.00
A 2310	Crown Phosphate and Potash.....	'F					14.00	1.26	18.00	1.00
							15.15	1.18	13.64	1.01
A 2501	Dissolved Bone Phosphate.....	Av.					15.03	1.22	13.81	1.14
	General Crop Fertilizer.....	'Q					17.50	0.84	16.66	
		'F							10.00	1.00
A 2425	Grain and Grass Grower.....	'Q	0.53	0.21	0.20	0.89	9.45	0.86	7.00	1.00
A 2427	High Grade Phosphate.....	'F				0.94	18.30	0.08	8.59	1.28
A 2289	Wheat and Corn Producer 1916.....	'Q	0.50	0.27	0.27	0.89	12.75	1.80	16.00	1.00
		'F				1.04			9.00	1.30
A 2239	Northwestern Horseshoe Brands Acidulated Bone Phosphate and Potash.....	'Q	0.41	0.20	0.32	0.89	12.28	1.24	10.00	1.00
		'F				0.93			11.04	1.21
A 2074	Animal Bone Phosphate Manure.....	'Q	0.43	0.24	0.20	0.89	9.30	1.10	7.00	1.00
A 2210	Animal Bone Phosphate Manure.....	'F	0.64	0.19	0.18	0.87	9.00	0.98	8.20	1.34
A 2339	Animal Bone Phosphate Manure.....		0.56	0.20	0.19	0.91	9.20	0.64	8.02	1.27
A 2541	Animal Bone Phosphate Manure.....		0.47	0.29	0.21	0.95	8.95	2.10	8.56	1.28
		Av.	0.50	0.23	0.20	0.97	9.12	1.21	7.91	1.28

* Full Samples.

* Abbreviations for Guaranteed and Found.

EXPERIMENT STATION BULLETIN

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

[illegible]

FERTILIZER ANALYSES

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A 1800	2 Potash Fertilizer	Imlay City	0.46	0.26	0.26	0.88	10.03	1.40	8.00
A 1826	2 Potash Fertilizer	Grant	0.44	0.22	0.34	0.08	10.65	2.16	2.06
A 2232	2 Potash Fertilizer	South Lyon	0.32	0.27	0.32	1.00	10.90	1.38	1.82
		Av.	0.41	0.25	0.30	0.96	10.83	1.65	2.00
A 1786	Potash Manure 1916	Cass City	0.62	0.17	0.21	0.88	11.30	1.70	1.96
A 1920*	Potash Manure 1916	St. Johns	0.51	0.27	0.22	1.00	11.45	2.37	8.00
A 1923*	Potash Manure 1916	Pompeii	0.44	0.30	0.26	1.00	12.20	2.42	0.98
A 2036	Potash Manure 1916	Holland	0.40	0.19	0.35	0.94	11.65	1.84	1.33
A 2357	Potash Manure 1916	Adrian	0.47	0.30	0.31	1.08	11.30	1.00	1.04
A 2451	Potash Manure 1916	Corunna	0.39	0.27	0.36	1.04	14.60	1.28	1.25
A 2637*	Potash Manure 1916	Plymouth	0.43	0.15	0.28	1.06	10.25	1.22	1.09
A 2689*	Potash Manure 1916	Elm	0.46	0.22	0.24	0.94	10.70	1.86	1.07
		Av.	0.47	0.23	0.28	0.98	11.08	1.71	1.17
A 2201	Quick Acting Phosphate	Imlay City	0.28	0.31	0.28	0.88	12.05	0.88	10.00
A 2255	Quick Acting Phosphate	Petersburg	0.28	0.31	0.28	0.87	12.35	0.94	11.17
A 2500*	Quick Acting Phosphate	Petersburg	0.28	0.31	0.28	0.87	13.05	1.46	11.59
		Av.	0.28	0.31	0.28	0.87	12.48	1.09	11.39
A 1799	Square Deal Phosphate	Imlay City	0.28	0.31	0.28	0.87	16.90	1.26	14.00
A 2245	Square Deal Phosphate	Ida.	0.28	0.31	0.28	0.87	17.13	1.52	15.64
A 2502*	Square Deal Phosphate	Petersburg	0.28	0.31	0.28	0.87	16.95	0.60	16.35
A 2509*	Square Deal Phosphate	Ida.	0.28	0.31	0.28	0.87	16.50	0.48	16.04
		Av.	0.28	0.31	0.28	0.87	16.87	0.90	15.91
A 2237	Sugar Beet Fertilizer 1916	Petersburg	0.28	0.31	0.28	0.87	11.70	1.24	9.00
A 2241	XXX Fertilizer	Saline	0.28	0.31	0.28	0.87	13.70	0.98	1.00
A 2250	XXX Fertilizer	Petersburg	0.28	0.31	0.28	0.87	14.60	1.08	1.01
A 2589*	XXX Fertilizer	Petersburg	0.28	0.31	0.28	0.87	14.60	0.52	0.98
		Av.	0.28	0.31	0.28	0.87	14.30	0.85	1.01
A 1825	Packers Boars Head Brands Ammoniated Bone Phosphate and Potash	Kent City	0.58	0.19	0.33	0.82	14.50	1.98	1.00
	Corn and Wheat Grower 1910		0.58	0.19	0.33	1.10	14.50	1.98	1.11
A 1977*	Corn and Wheat Grower 1918	Harlem	0.52	0.51	0.34	1.66	11.95	1.58	8.00
A 2439	Corn and Wheat Grower 1918	Washington	0.58	0.74	0.44	1.47	11.62	1.38	10.36
		Av.	0.50	0.64	0.40	1.72	11.79	1.47	10.52

*Full Samples.
Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid		Potash Total	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble Available		
Packers Bears Head Brands—Cont.									
A 2275	Faultless Grain Grower.	Watts	0.55	0.18	0.20	0.82	10.15	7.00	1.00
A 2349	Faultless Grain Grower.	Osseo.	0.53	0.22	0.19	0.94	9.20	0.70 0.82	0.45 8.38
		Av.	0.54	0.20	0.20	0.94	9.68	0.76	1.26
A 2507	Gilt Edge Phosphate	Devereaux	.....	.....	.....	.....	17.10	0.78	11.00
A 2563*	Gilt Edge Phosphate.	Willis.	.....	.....	.....	.....	16.25	0.16	16.32 16.09
		Av.	.....	.....	.....	.....	16.68	0.47	16.21
A 1831	New Compound.	Holland.	0.54	0.20	0.27	0.82	14.20	2.42	10.00
A 1851*	New Compound.	Nunica.	0.52	0.24	0.25	1.01	13.03	1.85	11.78
A 1884*	New Compound.	Kent City.	0.47	0.26	0.24	0.97	15.70	2.28	13.12
A 1909*	New Compound.	Lake Odessa.	0.48	0.23	0.30	1.01	13.05	1.86	11.19
A 2212	New Compound.	Elm.	0.59	0.20	0.28	1.11	13.80	2.32	11.48
A 2229	New Compound.	Brighton.	0.28	0.27	0.30	0.91	13.40	1.48	11.92
A 2276	New Compound.	Watts.	0.48	0.20	0.31	1.08	12.93	1.90	11.03
A 2512*	New Compound.	Montgomery.	0.64	0.20	0.29	1.13	14.25	2.78	11.47
A 2562*	New Compound.	Willis.	0.46	0.23	0.31	1.00	13.70	1.64	12.06
		Av.	0.50	0.24	0.29	1.03	13.78	2.03	11.73
A 2350	New Compound and Potash Fertilizer.	Osseo.	0.41	0.23	0.33	0.82	11.25	1.26	8.00 9.99
A 2277	Phosphatash Fertilizer	Watts.	.....	.....	.....	.....	13.05	1.24	12.00 12.71
A 1850*	16% Phosphate.	Nunica.	.....	.....	.....	.....	18.50	0.40	16.00 18.10
A 1908*	16% Phosphate.	Lake Odessa.	.....	.....	.....	.....	18.75	0.31	18.10 18.41
A 2189	16% Phosphate.	Ashley.	.....	.....	.....	.....	18.42	0.82	17.60 17.60
A 2228	10% Phosphate.	Brighton.	.....	.....	.....	.....	18.85	1.86	16.90 16.90
		Av.	.....	.....	.....	.....	19.63	0.86	17.77
A 1830	Soluble Phosphate.	Holland.	.....	.....	.....	.....	13.50	0.86	10.00 12.61
A 2604*	Soluble Phosphate.	Willis.	.....	.....	.....	.....	12.30	0.20	12.61 13.10
		Av.	.....	.....	.....	.....	12.90	0.53	12.37

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid		Potash Total	
			As Soluble	As Active Incombustible Organic	As Incombustible Organic	Total	Insoluble		Available
Armour Fertilizer Works—Cont.									
A 1788	Michigan Special	Capac	0.35	0.33	0.26	0.88	10.50	8.00	1.00
A 1848*	Michigan Special	Vermontville	0.48	0.28	0.11	0.94	10.30	9.34	0.58
A 1913*	Michigan Special	Mulliken	0.40	0.35	0.27	0.87	10.50	8.90	1.61
A 2080	Michigan Special	Three Oaks	0.23	0.32	0.22	1.02	9.53	8.78	1.78
A 2115	Michigan Special	Kalamazoo	0.38	0.41	0.21	0.77	10.50	8.39	0.83
A 2173	Michigan Special	Clarksville	0.34	0.37	0.22	1.00	11.20	9.28	0.89
A 2237	Michigan Special	Ann Arbor	0.17	0.33	0.20	0.93	10.15	8.63	0.93
A 2242	Michigan Special	Ypsilanti	0.40	0.45	0.25	1.10	9.53	8.25	1.19
A 2388	Michigan Special	Bay City	0.33	0.34	0.20	0.87	10.90	8.90	0.79
A 2404*	Michigan Special	Capac	0.34	0.35	0.24	0.98	10.12	9.15	0.75
		Av.				0.93	10.32	8.82	0.96
A 2148	Phosphate and Potash Special	Butternut						10.00	1.00
A 2176	Phosphate and Potash Special	Sunfield					11.00	0.58	1.00
A 2243	Phosphate and Potash Special	Ypsilanti					11.70	0.60	0.82
A 2272	Phosphate and Potash Special	Carleton					10.33	0.58	0.57
A 2317	Phosphate and Potash Special	Allen					10.50	0.50	0.56
A 2547*	Phosphate and Potash Special	Charlotte					10.50	0.46	0.54
		Av.					12.00	1.44	0.80
A 2118	Special Celery and Truck Grower	Kalamazoo	1.00	0.74	0.24	2.50	11.03	0.69	1.00
		Av.				2.58	11.35	1.41	1.06
A 1823	Special Grain Grower	Nashville	0.78	0.50	0.33	1.65	11.30	2.76	1.00
A 2126	Special Grain Grower	Detroit	0.80	0.57	0.30	1.61	10.50	2.41	0.92
A 2142	Special Grain Grower	Coloma	0.57	0.66	0.35	1.58	10.90	1.80	0.99
		Av.	0.72	0.58	0.35	1.65	10.90	2.32	1.11
A 2389	Standard	Bay City	0.42	0.36	0.20	0.88	9.55	1.32	0.90
		Av.				0.98		8.23	2.41
A 1838*	Star Phosphate	Coopersville					18.55	2.32	14.00
A 2140	Star Phosphate	Coloma					16.55	0.06	15.80
A 2238	Star Phosphate	Ann Arbor					13.08	0.28	13.70
A 2273	Star Phosphate	Carleton					15.83	0.14	15.00
A 2650*	Star Phosphate	St. Clair					16.35	0.04	15.71
		Av.					16.25	0.81	15.44

FERTILIZER ANALYSES

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A 1780	Wheat, Corn and Oats Special	Capac.....	0.25	0.25	0.20	0.88	0.20	1.02	7.00	1.00
A 1920*	Wheat, Corn and Oats Special	Butternut.....	0.45	0.31	0.26	0.76	10.15	2.46	8.18	0.88
A 2051	Wheat, Corn and Oats Special	Coopersville.....	0.22	0.35	0.23	0.80	9.30	7.36	7.09	0.88
A 2061	Wheat, Corn and Oats Special	Three Oaks.....	0.31	0.27	0.22	0.80	9.10	1.08	7.36	0.92
A 2110	Wheat, Corn and Oats Special	Butternut.....	0.33	0.30	0.20	0.86	10.45	1.90	7.02	0.99
A 2172	Wheat, Corn and Oats Special	Clarksville.....	0.31	0.33	0.22	0.86	10.45	1.90	8.55	0.88
A 2274	Wheat, Corn and Oats Special	Carleton.....	0.30	0.30	0.21	0.81	10.90	1.72	9.18	0.71
A 2275	Wheat, Corn and Oats Special	Lake Okauch.....	0.32	0.30	0.22	0.90	8.40	1.12	7.28	1.18
A 2520*	Wheat, Corn and Oats Special	Allen.....	0.29	0.35	0.24	0.88	15.25	2.62	8.28	1.26
A 2540*	Wheat, Corn and Oats Special	Charlotte.....	0.29	0.37	0.31	0.97	10.05	2.10	7.95	1.16
	Av.		0.31	0.32	0.23	0.86	9.75	1.80	7.95	0.98
A 1822	1-9-1 Fertilizer.....	Nashville.....	0.28	0.34	0.26	0.82	12.85	1.52	9.00	1.00
						0.82	11.33	1.52	10.53	0.84
A 2028*	1-10 Fertilizer.....	Ypsilanti.....	0.24	0.33	0.44	0.89	12.35	1.52	10.00	1.00
A 2177	1-12-1 Fertilizer.....	Sunfield.....	0.48	0.30	0.17	0.89	11.30	1.44	12.86	1.24
A 2032*	1-12-1 Fertilizer.....	Montgomery.....	0.32	0.33	0.32	0.97	14.85	1.44	15.31	1.11
	Av.		0.40	0.36	0.25	1.01	14.58	1.44	13.14	1.18
A 2117	3-8-1 Fertilizer.....	Kalamazoo.....	1.15	0.67	0.25	2.07	11.30	1.37	8.00	1.00
						2.07	10.55	2.08	9.93	1.51
A 2387	1½-7-3 Fertilizer.....	Day City.....	2.24	0.84	0.41	3.71	10.55	2.08	7.00	3.00
	Tuscarora Brands					3.49	10.55	2.08	8.47	3.45
A 2002	Acid Phosphate.....	Cadillac.....					15.94	0.18	14.00	
A 2188	Acid Phosphate.....	Barton.....					17.65	0.47	15.70	
							10.79	0.32	17.18	
A 2486	Phosphate and Potash Special.....	Barton.....					11.15	0.02	10.00	1.00
							11.15	0.02	10.53	0.51
A 1844	Special Corn, Wheat and Bean Grower.....	Zeeeland.....	0.20	0.38	0.10	0.88	11.20	2.30	8.00	1.00
A 1979*	Special Corn, Wheat and Bean Grower.....	Detroit.....	0.44	0.28	0.19	0.81	10.00	1.64	8.90	1.20
A 2101	Special Corn, Wheat and Bean Grower.....	Cadillac.....	0.50	0.38	0.20	1.08	10.30	0.08	9.36	1.02
A 2444	Special Corn, Wheat and Bean Grower.....	New Buffalo.....	0.33	0.31	0.21	0.88	11.00	1.92	8.64	0.95
A 2487	Special Corn, Wheat and Bean Grower.....	Barton.....	0.22	0.32	0.27	0.81	9.08	1.46	9.08	0.83
	Av.		0.36	0.33	0.22	0.91	10.32	1.60	8.72	0.94
A 2103	Special Standard.....					1.66			8.00	1.00
	Standard	Canilline.....	0.81	0.65	0.45	1.66	13.95	2.56	8.00	3.00
						1.91			11.45	3.29

*Full Samples.

Abbreviations for Guaranteed and Found.

*Duplicate sample of A 1788.

EXPERIMENT STATION BULLETIN

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Armour Fertilizer Works—Cont.										
A 1821	Tankage and Phosphate.	'G	0.86	0.75	0.38	1.65	13.05	3.18	10.00	.....
A 2489	Tankage and Phosphate	'F	0.58	0.62	0.51	1.71	13.55	2.58	9.87	.....
		Av.	0.72	0.69	0.44	1.85	13.30	2.88	10.42	.....
A 1845	1-10 Fertilizer	'G	0.31	0.20	0.30	0.82	12.50	1.40	10.00	.....
	R. Binder Co., Battle Creek, Mich.	'F	.....	.....	.....	0.90	.....	.....	11.10	.....
	Blood and Bone	'G	.....	.....	.....	5.25	13.17	.....	.....	.....
A 2087	F. Burton, St. Joseph, Mich.	'G	.....	.....	.....	3.00	.....	.....	12.00	.....
A	Meat and Bone Phosphate.	'F	0.70	1.49	1.26	3.45	16.65	5.26	11.39	.....
	Calumet Fertilizer Co., New Albany, Ind.	'G	.....	.....	.....	.....	.....	.....	14.00	.....
	Calumet 14% Acid Phosphate.	'G	.....	.....	.....	0.60	.....	.....	8.50	0.50
	Calumet Coburn's Special with Potash.	'G	.....	.....	.....	.....	.....	.....	13.00	1.00
	Calumet Special Dissolved Bone and Potash	'G	.....	.....	.....	.....	.....	.....	16.00	.....
A 1767	Darling & Company, Chicago, Ill.	'G	.....	.....	.....	.....	18.20	1.30	16.90	.....
A 1834	16% Acid Phosphate.	'F	.....	.....	.....	.....	22.00	3.04	18.96	.....
A 1878*	16% Acid Phosphate.	.....	.....	.....	.....	.....	19.60	1.80	17.80	.....
A 1898*	16% Acid Phosphate.	.....	.....	.....	.....	.....	19.70	1.86	17.84	.....
A 2011	16% Acid Phosphate.	.....	.....	.....	.....	.....	18.45	1.06	17.39	.....
A 2057	16% Acid Phosphate.	.....	.....	.....	.....	.....	19.02	1.08	17.94	.....
A 2221	16% Acid Phosphate.	.....	.....	.....	.....	.....	18.55	1.22	17.33	.....
		Av.	.....	.....	.....	.....	19.36	1.62	17.74	.....
A 2004	Big Harvest.	'G	0.48	0.72	0.57	1.65	16.90	4.08	12.82	1.00
A 2088	Big Harvest.	'F	0.40	0.80	0.61	1.81	15.70	4.52	11.18	1.29
		Av.	0.44	0.76	0.59	1.79	16.30	4.30	12.00	1.25
A 2023*	Farmers Favorite.	'G	0.20	0.26	0.35	0.87	10.95	1.80	8.00	1.00
A 2124	Farmers Favorite.	'F	1.58	0.09	0.18	1.85	10.23	2.87	7.66	2.58
A 2146	Farmers Favorite	.....	0.36	1.40	0.86	2.82	12.00	3.80	9.00	1.06
A 2203	Farmers Favorite	1.43	0.06	0.13	1.62	12.55	2.06	10.49	0.97
		Av.	0.96	0.46	0.38	1.80	11.50	2.48	9.08	1.45

FERTILIZER ANALYSES

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A 2042*	General Crop.	Holland.	°G	0.55	0.65	1.65	14.45	19.00
A 2513*	General Crop.	Vicksburg.	°F	0.76	0.38	1.47	16.33	10.91
			Av.	0.66	0.51	1.58	15.36	11.15	.....
A 1768	Grain Grower.	Minden City.	°G	0.23	0.13	0.88	10.85	9.00	1.00
A 1944*	Grain Grower.	Carroll.	°F	0.30	0.16	0.52	10.85	9.00	0.99
A 2004*	Grain Grower.	Mapleasant.	°G	0.41	0.09	0.81	9.97	7.32	1.05
A 2010	Grain Grower.	Cassiova.	°F	0.41	0.36	1.04	13.90	10.10	1.17
A 2021	Grain Grower.	Grand Rapids.	°G	0.29	0.19	0.63	12.25	9.77	0.98
A 2024	Grain Grower.	Grand Rapids.	°F	0.31	0.17	0.70	12.40	9.52	1.11
A 2051	Grain Grower.	Nunica.	°G	0.31	0.36	0.80	11.30	8.64	1.11
A 2530*	Grain Grower.	Reading.	°F	0.40	0.33	0.97	11.95	8.78	0.94
			Av.	0.32	0.24	0.81	11.80	8.97	1.02
A 1877*	Half and Half Brand.	Fillmore Center.	°G	0.31	0.36	0.88	25.18	12.00	.....
A 2012	Half and Half Brand.	Cassiova.	°F	0.28	0.25	0.87	24.10	13.10	.....
A 2125	Half and Half Brand.	Decatur.	°G	0.26	0.46	0.98	24.25	12.08	.....
A 2164	Half and Half Brand.	Sparta.	°F	0.27	0.34	0.90	23.70	14.40	.....
A 2337	Half and Half Brand.	Reading.	°G	0.43	0.34	0.97	24.27	11.51	.....
			Av.	0.31	0.37	0.93	24.30	12.62	.....
A 1876*	Little Giant.	Fillmore Center.	°G	0.25	0.12	0.88	14.40	10.00	.....
A 1895*	Little Giant.	Burns Corner.	°F	0.26	0.40	0.86	10.75	10.10	.....
A 2035	Little Giant.	Holland.	°G	0.24	0.13	0.93	2.46	8.29	.....
A 2040	Little Giant.	Holland.	°F	0.22	0.15	0.62	11.73	8.85	.....
A 2055	Little Giant.	Nunica.	°G	0.26	0.37	0.64	12.70	7.85	.....
A 2248	Little Giant.	Ida.	°F	0.34	0.17	1.04	12.42	8.98	.....
			Av.	0.26	0.22	0.81	12.48	9.24	.....
A 2103	Pulverized Sheep Manure.	Allegan.	°G	0.43	0.26	2.06	1.00	1.00	.....
A 2018	Pulverized Sheep Manure.	Grand Rapids.	°F	0.39	0.43	1.96	2.00	1.64	1.48
A 2132	Pulverized Sheep Manure.	Battle Creek.	°G	0.36	0.53	1.96	2.15	1.95	2.16
A 2452	Pulverized Sheep Manure.	Lansing.	°F	0.66	0.51	2.72	2.85	1.67	2.38
			Av.	0.46	0.43	2.30	2.75	1.47	2.34
A 1763	Pure Ground Bone.	Imley City.	°G	0.52	0.90	1.85	26.00	2.10	.....
A 1833	Pure Ground Bone.	Sparta.	°F	0.60	1.29	2.12	27.74	.....	.....
A 2024	Pure Ground Bone.	Grand Rapids.	°G	0.68	0.91	2.02	27.45	.....	.....
A 2165	Pure Ground Bone.	Sparta.	°F	0.98	0.91	2.02	29.50	.....	.....
A 2170	Pure Ground Bone.	Muskegon Heights.	°G	0.48	1.03	2.04	28.85	.....	.....
A 2484	Pure Ground Bone.	Tecumseh.	°F	0.52	1.09	2.09	28.75	.....	.....
A 2550*	Pure Ground Bone.	Lansing.	°G	0.58	0.92	2.09	28.20	.....	.....
			Av.	0.55	1.01	2.12	28.50	.....	.....

* Fall Samples.
 ° Abbreviations for Guaranteed and Found. * Removed from sale by manufacturer.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Total
Federal Chemical Co.—Cont.										
A 2490	King Crop Grower.....	Leonard.....	0.00	0.38	0.48	0.86	21.65	7.70	8.00	1.00
A 1968*	Liberty Wheat and Corn Grower.....	Clifford.....	0.10	0.12	0.23	0.41	21.30	8.50	12.80	1.22
A 1969*	Liberty Wheat and Corn Grower.....	North Branch.....	0.03	0.17	0.32	0.52	19.40	16.80	14.60	1.04
A 2643*	Liberty Wheat and Corn Grower.....	Farmington.....	0.11	0.08	0.26	0.45	20.10	8.36	11.74	1.43
		Av.	0.08	0.12	0.27	0.47	20.27	9.22	11.05	1.23
A 1756	Michigan Bean and Beet Special.....	Elkton.....	0.25	0.03	0.14	0.41	10.25	8.15	11.00	1.00
A 1774	Nichigan Bean and Beet Special.....	Harbor Beach.....	0.14	0.08	0.25	0.45	12.30	1.10	11.20	0.94
A 1779	Nichigan Bean and Beet Special.....	Bad Axe.....	0.23	0.02	0.10	0.35	19.75	6.84	12.91	0.98
A 1795	Nichigan Bean and Beet Special.....	Imlay City.....	0.10	0.10	0.32	0.52	12.27	2.10	10.17	0.65
A 1932*	Michigan Bean and Beet Special.....	Harbor Beach.....	0.11	0.07	0.24	0.42	12.20	0.94	11.26	1.11
		Av.	0.17	0.06	0.20	0.43	15.16	3.83	11.33	0.94
A 2304	Nitro Phosphate.....	Dundee.....	0.18	0.09	0.10	0.41	17.90	1.74	16.16	1.50
A 2518*	Old Cap's Tobacco Compound.....	Quincy.....	0.15	0.09	0.25	0.41	19.75	6.06	13.69	1.14
A 1974*	Potash Special.....	Ionia.....					14.20	1.14	10.00	1.29
A 2109	Pure Bone.....	Plainwell.....	0.28	0.52	0.18	1.00	30.00		10.00	
A 1921*	Special Phosphate Mixture.....	Ithaca.....				0.98	30.60		11.54	
A 1763	Staff-O-Life Fertilizer.....	Minden City.....	0.32	0.03	0.02	0.41	23.53	12.84	10.69	
A 1778	Staff-O-Life Fertilizer.....	Bad Axe.....	0.17	0.50	0.20	0.87	21.08	12.58	8.50	
A 2307	Staff-O-Life Fertilizer.....	Millington.....	0.00	0.00	0.00	0.00	23.65	7.16	16.49	
		Av.	0.16	0.18	0.07	0.41	22.75	10.86	11.89	
A 1972*	Standard Meal Mixture.....	Imlay City.....	0.63	0.08	0.11	0.82	21.20	7.70	10.00	
A 2033	Standard Meal Mixture.....	Holland.....	0.06	0.42	0.34	0.81	24.50	14.83	9.67	
A 2147	Standard Meal Mixture.....	Lakeview.....	0.44	0.18	0.17	0.79	26.00	16.81	8.79	
		Av.	0.37	0.23	0.21	0.81	23.76	13.11	10.65	

FERTILIZER ANALYSES

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A 1755	Standard Wheat and Corn Maker	Elkton	0.27	0.02	0.10	0.43	20.60	8.04	11.50	0.50
A 1765	Standard Wheat and Corn Maker	Minden City	0.12	0.10	0.35	0.32	18.15	8.20	12.54	0.43
A 1807	Standard Wheat and Corn Maker	Charlotte	0.12	0.10	0.25	0.32	19.55	8.28	12.25	0.41
A 1809	Standard Wheat and Corn Maker	Coopersville	0.08	0.10	0.25	0.31	17.85	8.38	13.07	0.43
A 1808	Standard Wheat and Corn Maker	Algon	0.20	0.08	0.17	0.41	16.95	8.65	12.97	0.46
A 2028	Standard Wheat and Corn Maker	Zeland	0.15	0.12	0.14	0.38	19.75	1.02	11.26	0.50
A 2021	Standard Wheat and Corn Maker	Holland	0.10	0.12	0.14	0.38	12.40	1.02	11.26	0.50
A 2073	Standard Wheat and Corn Maker	Coopersville	0.11	0.08	0.24	0.48	13.65	1.98	11.72	0.52
A 2070	Standard Wheat and Corn Maker	Millington	0.19	0.11	0.24	0.30	10.60	7.82	11.78	0.71
A 2068	Standard Wheat and Corn Maker	Millington	0.19	0.14	0.07	0.40	22.60	6.50	13.04	0.70
A 2505	Standard Wheat and Corn Maker	Litchfield	0.35	0.10	0.20	0.73	17.70	6.00	11.70	0.72
A 2506	Standard Wheat and Corn Maker	Reading	0.21	0.08	0.20	0.50	19.75	6.02	13.73	0.48
A 2509	Standard Wheat and Corn Maker	Monagomery	0.14	0.08	0.24	0.40	19.90	5.02	13.62	0.34
A 2572	Standard Wheat and Corn Maker	Amala	0.16	0.06	0.19	0.41	13.63	2.83	10.70	0.24
	Av.		0.18	0.00	0.21	0.48	18.02	5.55	12.47	0.47
A 1757	Sugar Beet Special	Pigeon					21.70	11.68	10.00	1.00
A 1039	Sugar Beet Special	Crowell					22.80	12.68	10.02	0.65
	Av.						22.25	12.18	10.07	0.38
A 1755	Twenty-Four Phosphate	Pigeon					26.05	17.28	10.00	
A 1764	Twenty-Four Phosphate	Minden City					25.00	15.72	8.77	
A 1773	Twenty-Four Phosphate	Harbor Beach					25.98	16.07	10.18	
A 1780	Twenty-Four Phosphate	Bad Axe					25.90	15.56	9.01	
A 2032	Twenty-Four Phosphate	Holland					27.60	17.50	10.34	
A 2032	Twenty-Four Phosphate	Coopersville					25.05	16.09	10.10	
A 2030	Twenty-Four Phosphate	Nunica					27.00	15.32	9.58	
	Av.						26.30	16.35	11.68	
									9.95	
A 2433	Wheat and Corn Special	Romeo	0.27	0.07	0.22	0.41	20.60	7.82	11.00	1.00
A 2524	Wheat and Corn Special	Litchfield	0.03	0.10	0.36	0.56	17.35	4.04	12.78	1.00
A 2646	Wheat and Corn Special	Romeo	0.22	0.07	0.19	0.48	19.25	7.84	13.31	1.08
	Av.		0.17	0.08	0.26	0.51	19.07	6.57	12.50	0.97
									16.00	1.00
A 2411	Wheat and Grain Special	Chesaning	0.47	0.06	0.20	0.73	14.42	1.94	12.48	0.74
									10.00	
A 1873	400 Phosphate Mixture	Coopersville					24.40	14.35	10.00	
A 1948	400 Phosphate Mixture	Bad Axe					22.80	10.85	10.05	
A 2647	400 Phosphate Mixture	St. Clair					24.20	12.64	11.50	
	Av.						23.80	13.24	10.56	

* Fall Samples.
* Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
The Fertilizer Chemical Co., Cleveland, O.										
A 2573*	Lime-Fertilizer.....	'0					3.00			
A 2585*	Lime-Fertilizer.....	'F					2.65			
A 2620*	Lime-Fertilizer.....						2.80			
		Maybee.....					2.55			
		Av.					2.67			
A 2471	Nitro Fertilizer.....	'0	2.62			2.00	5.15		3.00	3.00
		'F				2.62			5.13	4.31
Cleaner Clearing House Association, Detroit, Mich.										
	Ammonia and Phosphoric Acid.....	'0				1.66			10.00	
A 2504	14% Acid Phosphate.....	'0					15.40	0.05	14.00	
		'F							14.75	
	Bean and Corn Grower.....	'0				0.88			10.00	1.00
	General Grower.....	'0				0.88			8.00	1.00
	Grain Special.....	'0				1.65			10.00	1.00
	Phosphoric Acid and Potash.....	'0							10.00	3.00
A 2506	Wolverine Pride.....	'0	0.52	0.33	0.28	0.88	11.36	2.48	8.00	3.00
		'F				1.18			8.88	2.06
The Independent Packers Fertilizer Co., Columbus, Ohio										
A 1901*	No. 1 Independent Favorite.....	'0				0.88			11.00	0.50
A 2349	No. 1 Independent Favorite.....	'F	0.12	0.17	0.45		13.90	1.20	12.70	0.56
A 2349	No. 1 Independent Favorite.....		0.30	0.20	0.19	0.78	12.75	1.70	11.05	0.43
A 2442	No. 1 Independent Favorite.....		0.29	0.22	0.25	0.76	12.85	1.90	10.89	0.71
A 2576*	No. 1 Independent Favorite.....		0.39	0.24	0.27	0.90	11.10	1.92	12.18	0.69
A 2582*	No. 1 Independent Favorite.....		0.39	0.12	0.20	0.80	12.50	1.48	11.02	0.40
		Blissfield.....								
		Av.	0.32	0.19	0.29	0.80	13.22	1.65	11.57	0.58
No. 2 Bone Meal and Phosphate Mixture.....										
		'0				0.88			8.00	1.00

FERTILIZER ANALYSES

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A 2292	No. 3 Corn, Wheat, Oats and Clover.....	%	0.31	0.23	0.21	0.75	10.15	1.52	8.00	0.60
A 2365	No. 3 Corn, Wheat, Oats and Clover.....	%	0.30	0.18	0.28	0.76	9.50	1.14	8.36	0.52
A 2401	No. 3 Corn, Wheat, Oats and Clover.....	%	0.35	0.24	0.23	0.82	10.45	1.64	8.51	0.60
A 2575*	No. 3 Corn, Wheat, Oats and Clover.....	%	0.34	0.23	0.26	0.85	9.65	1.75	7.00	0.58
A 2581*	No. 3 Corn, Wheat, Oats and Clover.....	%	0.42	0.10	0.23	0.84	9.35	0.52	8.53	0.32
	Av.		0.36	0.20	0.24	0.80	9.82	1.37	8.45	0.51
A 2208	No. 4 Independent Grain Special.....	%	0.42	0.13	0.20	0.86	9.50	1.11	8.00	1.00
A 2353	No. 4 Independent Grain Special.....	%	0.45	0.12	0.22	0.79	8.95	1.00	8.36	0.90
A 2364	No. 4 Independent Grain Special.....	%	0.14	0.21	0.42	0.77	10.45	1.92	7.95	0.85
	Av.		0.34	0.15	0.28	0.77	9.63	1.35	8.28	0.93
A 1945*	No. 4 Independent Grain Special (Fall 1918;.....	%	0.16	0.61	0.17	0.47	9.95	1.78	8.00	1.00
A 2520*	No. 4 Independent Grain Special (Fall 1918;.....	%	0.11	0.09	0.12	0.32	10.10	1.86	8.24	0.71
A 2501*	No. 4 Independent Grain Special (Fall 1918;.....	%	0.12	0.06	0.18	0.36	10.00	2.06	7.91	0.92
A 2631*	No. 4 Independent Grain Special (Fall 1918;.....	%	0.12	0.05	0.17	0.34	9.58	1.87	7.71	1.63
	Av.		0.13	0.06	0.16	0.35	9.91	1.89	8.02	0.91
A 2100	No. 5 Universal Crop.....	%	1.01	0.38	0.25	1.67	12.35	1.22	10.00	11.13
A 2269	No. 7 Corn and Wheat Special.....	%	0.46	0.10	0.23	0.82	9.80	1.20	8.00	2.01
A 2354	No. 7 Corn and Wheat Special.....	%	0.52	0.09	0.19	0.80	9.60	1.12	8.48	1.95
A 2370	No. 7 Corn and Wheat Special.....	%	0.56	0.09	0.23	0.88	10.20	1.50	8.70	1.00
	Av.		0.51	0.09	0.22	0.82	9.87	1.28	8.59	1.95
A 2327	No. 8 Ammoniated Special.....	%	0.10	0.16	0.20	0.41	12.70	1.52	10.00	12.00
A 2402	No. 8 Ammoniated Special.....	%	0.05	0.11	0.25	0.41	12.45	2.56	12.70	12.70
A 2393*	No. 8 Ammoniated Special.....	%	0.00	0.21	0.31	0.52	12.35	1.70	10.65	10.65
	Av.		0.05	0.16	0.25	0.46	12.50	1.93	10.57	10.57
A 2263	No. 9 Ammoniated Phosphate.....	%	0.04	0.16	0.26	0.41	14.70	2.00	12.00	12.00
A 2403	No. 9 Ammoniated Phosphate.....	%	0.08	0.10	0.23	0.41	14.25	1.98	12.27	12.27
	Av.		0.06	0.13	0.25	0.44	14.48	1.99	12.49	12.49
A 2355	No. 11 High Grade Phosphate.....	%					17.85	3.30	16.00	16.00
A 2577*	No. 11 High Grade Phosphate.....	%					17.18	2.98	14.55	14.55
	Av.						17.52	3.14	14.38	14.38
A 2399	Michigan Bean and Truck Special.....	%	0.13	0.26	0.35	0.74	10.20	1.64	8.00	2.00
A 2263	Sugar Beet Special.....	%	0.45	0.13	0.19	0.82	10.15	1.21	8.56	1.87
						0.77			8.91	0.83

*Full Sample.

Abbreviations for Guaranteed and Found.

FERTILIZER ANALYSES

A 2462	Buffalo Buckeye Brand.....	Grand Ledge.....	11.52	1.14	10.38	1.10
A 2538*	Buffalo Buckeye Brand.....	Montgomery.....	10.85	0.64	10.21	0.68
		Av.....	11.41	0.90	10.51	0.86
	Buffalo Complete Fertilizer.....	'Q.....	1.60		8.00	1.00
A 1917*	Buffalo Crop Grower.....	Grand Ledge.....	0.80		8.00	1.00
A 2065	Buffalo Crop Grower.....	Lawrence.....	0.93	1.44	9.11	0.91
A 2332	Buffalo Crop Grower.....	Montgomery.....	0.32	0.52	8.78	0.98
A 2332	Buffalo Crop Grower.....	Montgomery.....	0.38	1.56	9.49	1.59
A 2380	Buffalo Crop Grower.....	Bay City.....	0.37	1.02	8.26	1.08
		Av.....	0.36	1.19	8.01	1.14
A 1978*	Buffalo Dissolved Phosphate.....	West Olive.....	16.25	0.64	15.61	
A 1842*	Buffalo Grain Grower.....	Hudsonville.....	0.80	1.05	13.05	
A 2330	Buffalo Grain and Grass Grower.....	Reading.....	0.80		8.00	\$ 0.00
A 2381	Buffalo Grain and Grass Grower.....	Bay City.....	0.81	0.84	10.56	2.04
		Av.....	0.43	0.81	8.22	2.03
A 2331	Buffalo Phosphate and Potash.....	Reading.....	0.94	0.81	9.39	2.04
A 2025	Buffalo Two-Eight-Two.....	Hudsonville.....	1.60	0.90	12.00	\$ 0.00
		'Q.....	1.58	0.84	7.71	1.75
A 2250	Acid Phosphate.....	Petersburg.....			16.00	
A 2293	Acid Phosphate.....	Belleville.....	19.93	0.58	19.35	
A 2362	Acid Phosphate.....	Blissfield.....	19.35	2.44	15.01	
		Av.....	18.91	1.13	17.78	
A 1889*	Ammoniated Phosphate.....	Conklin.....	0.88		10.00	
A 2156	Ammoniated Phosphate.....	Sparta.....	0.70	1.54	11.16	
A 2159	Ammoniated Phosphate.....	Coopersville.....	0.80	1.06	11.09	
A 2340	Ammoniated Phosphate.....	Reading.....	0.26	1.14	11.46	
A 2407	Ammoniated Phosphate.....	Mayville.....	0.27	1.00	11.70	
A 2596*	Ammoniated Phosphate.....	Ida.....	0.12	1.28	11.72	
		Av.....	0.23	2.82	11.63	
A 1887*	Carrela.....	Conklin.....	0.81	1.47	11.46	
A 2292	Carrela.....	Belleville.....	1.66		12.00	
		'Q.....	1.42	1.34	13.61	
		Av.....	1.59	0.86	13.24	
			1.51	1.10	13.43	

* Fall Samples.
, Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
The Jarecki Chemical Co.—Cont.									
A 2161	C. O. D. Phosphate	Coopersville							
A 2288	C. O. D. Phosphate	Michigan							
A 2296	C. O. D. Phosphate	French Landing							
A 2323	C. O. D. Phosphate	Litchfield							
A 2598*	C. O. D. Phosphate	Ida.							
		Av.							
A 1870	Lake Erie Guano with Phosphate and Potash	Breckinridge							
A 2295	Lake Erie Guano with Phosphate and Potash	French Landing							
A 2321	Lake Erie Guano with Phosphate and Potash	Litchfield							
A 2341	Lake Erie Guano with Phosphate and Potash	Reading							
A 2615*	Lake Erie Guano with Phosphate and Potash	French Landing							
		Av.							
A 1839*	Little Giant	Coopersville							
A 1914*	Little Giant	Grand Ledge							
A 2155	Little Giant	Sparta							
A 2160	Little Giant	Coopersville							
A 2251	Little Giant	Petersburg							
A 2264	Little Giant	Erie							
A 2370	Little Giant	Litchfield							
A 2797*	Little Giant	Ida.							
A 2609*	Little Giant	Walla.							
		Av.							
A 1888*	Middle West Formula	Conklin							
A 2322	Middle West Formula	Litchfield							
		Av.							
A 1804	Number One Formula	Sarnac							
A 1840*	Number One Formula	Coopersville							
A 1907*	Number One Formula	Lake Michigan							
A 2158	Number One Formula	Sparta							
A 2290	Number One Formula	Alma							
A 2220	Number One Formula	Plymouth							

A 2265 A 2270 A 2614*	Number One Formula..... Number One Formula..... Number One Formula.....	LaSalle..... Mayhew..... French Landing.....	0.30 0.47 0.56	0.18 0.11 0.13	0.24 0.28 0.13	0.81 0.91 0.94	11.43 12.15 13.13	2.03 2.54 1.50	8.80 9.01 11.63	1.08 0.76 1.05
A 2497	Raw Bone Phosphate Mixture.....	Munger.....	Av. 'G 'F	0.57 0.80 0.57	0.16 0.57 0.30	0.20 0.30	0.93 1.65 1.76	1.59 10.81 10.81	10.07 8.00 7.92	1.12
A 1819 A 2498	Special Sugar Beet Grower..... Special Sugar Beet Grower.....	Breckenridge..... Bach.....	'G 'F 'G 'F	0.70 0.65 0.68 0.68	0.16 0.12 0.14	0.25 0.17	0.82 1.11 0.94	1.98 1.18 1.58	9.00 11.02 9.52	1.00 1.04 1.45
A 1806 A 1911* A 2219 A 2280 A 2324	Tobacco and Truck Grower..... Tobacco and Truck Grower..... Tobacco and Truck Grower..... Tobacco and Truck Grower..... Tobacco and Truck Grower.....	Bradley..... Woodbury..... Plymouth..... Mabee..... Litchfield.....	'G 'F 'G 'F 'G 'F	0.41 0.60 0.40 0.38 0.72	0.21 0.11 0.15 0.21 0.12	0.19 0.14 0.16 0.17	0.82 0.81 0.97 0.94 0.75 1.01	10.90 8.20 11.80 11.60 8.73	8.00 10.06 7.48 10.84 10.50 7.95	2.75 1.93 2.13 1.28 2.10
A 2654*	Michigan State Grange, Detroit, Mich. All Crops Special Fertilizer 1916.....	Palmyra.....	Av. 'G 'F	0.51 0.52 0.52	0.17 0.31	0.10 0.21	0.90 0.82 1.04	10.25 11.65	0.88 2.52	2.04 1.00 1.04
A 2432	Complete Manure.....	Romeo.....	'G 'F	0.56 0.81	0.22 0.51	0.19 0.47	0.82 1.85	0.70 3.06	7.00 8.79	1.00 1.20
A 1828	Corn and Oats Fertilizer.....	Hopkins.....	'G 'F	0.81	0.51	0.47	1.63 1.85	3.06	8.00 8.79	.....
A 1827 A 2509	High Grade Phosphate and Potash..... High Grade Phosphate and Potash.....	Hopkins..... Clatskanie.....	'G 'F	.....	.....	.....	.....	.....	.....	.....
A 1829 A 2266	I X Fertilizer..... I X Fertilizer.....	Hopkins..... Monroe.....	Av. 'G 'F	0.53 0.18	0.28 0.23	0.20 0.26	0.82 1.01 0.97	2.24 2.32	10.00 12.96 10.88	1.00 0.91 1.04
A 2267 A 2455 A 2601*	Wheat Fertilizer No. 1..... Wheat Fertilizer No. 1..... Wheat Fertilizer No. 1.....	Monroe..... St. Johns..... Monroe.....	Av. 'G 'F	0.50	0.26	0.23	0.99	2.28	11.92	.....
A 2153	Wheat Fertilizer No. 2..... National Plant Food Co. Eau Claire, Wis. Red Scanner.....	.....	'G 'F	.....	.....	.....	.....	.....	.....	.....
		Lansing.....	'G 'F	1.41 2.01	2.01	1.55	5.00 5.01	5.71	4.00 6.70	1.25 1.53

*Fall Samples.

*Abbreviations for Guaranteed and Found

EXPERIMENT STATION BULLETIN

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble		Available
A 2086	Natural Guano Co., Aurora, Ill.					9.95		1.00	1.50
	"Sheep's Head" Pulverized Sheep Manure.								
	Nitrate Agencies Co., Columbus, Ohio				15.00				
	N. A. C. Nitrate of Soda.	Grand Rapids.			15.32				
A 1949* A 2418 A 2420	Nu-Life Fertilizer Co., Chicago, Ill.						14.00		
	Nu-Life Fertilizer.								
	The Packers Fertilizer Co., Sandusky, Ohio								
	Acid Phosphate.	Harbor Beach.					17.70	0.68	16.00
A 2500	Acid Phosphate.	St. Clair.					19.80	0.86	17.02
	Acid Phosphate.	Adair.					18.42	0.88	17.54
	Acidulated Phosphate.	Vassar.					18.64	0.81	17.83
	Ammoniated Phosphate.	Ionia.	0.53	0.20	0.10	0.83	10.15	0.82	9.00
A 1817	Big Bonanza.	Carson City.	1.21	0.21	0.22	1.65	15.45	1.00	14.45
	Favorite Grain Grower.	Millington.	0.34	0.26	0.21	0.82	12.50	1.48	10.00
	O. K. Fertilizer.	Harbor Beach.	0.25	0.15	0.11	0.51	13.00	1.68	10.00
	O. K. Fertilizer.	Vassar.	0.32	0.07	0.12	0.51	11.85	2.72	10.00
A 2301 A 2419	O. K. Fertilizer.	Adair.	0.31	0.07	0.14	0.52	13.60	2.42	11.18
A 1955* A 2380 A 2382 A 2603*	Phosphate with Humus.	Ruth.	0.35	0.12	0.04	0.51	15.73	1.82	12.00
	Phosphate with Humus.	Vassar.	0.13	0.10	0.23	0.46	14.00	1.02	12.98
	Phosphate with Humus.	Vassar.	0.23	0.07	0.08	0.38	16.13	1.50	14.67
	Phosphate with Humus.	Carlleton.	0.27	0.06	0.08	0.41	13.85	0.80	12.90
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950* A 2301 A 2419			0.20	0.10	0.12	0.51	13.82	2.27	11.55
A 1950*									

FERTILIZER ANALYSES

[illegible]

Fall Samples.

Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid			Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble	Available		Total
F. S. Royster Guano Co.—Cont.										
A 2449	Black Soil Guano.	Leinsburg.	0.51	0.19	0.38	0.88	10.95	3.14	8.00	5.00
A 2481	Black Soil Guano.	Manchester.	0.56	0.21	0.25	1.02	12.20	3.08	7.81	5.83
		Av.	0.53	0.20	0.27	1.00	11.58	3.11	8.47	5.24
A 1933*	Cuckoo Crop Grower.	Shepherd.	0.31	0.19	0.25	0.82	9.10	1.24	8.00	1.00
A 1954*	Cuckoo Crop Grower.	Ruth.	0.33	0.22	0.28	0.75	9.65	1.10	7.86	0.95
A 2102	Cuckoo Crop Grower.	Allegan.	0.61	0.06	0.21	0.88	11.00	0.46	8.55	1.03
A 2107	Cuckoo Crop Grower.	Osgood.	0.60	0.06	0.22	0.88	10.00	0.62	9.38	1.03
A 2121	Cuckoo Crop Grower.	Decatur.	0.30	0.14	0.40	0.84	11.25	1.47	9.78	1.17
A 2215	Cuckoo Crop Grower.	Plymouth.	0.42	0.08	0.20	0.70	9.10	0.56	8.54	0.99
A 2260	Cuckoo Crop Grower.	Erie.	0.39	0.09	0.15	0.63	8.22	0.62	7.60	1.03
A 2627*	Cuckoo Crop Grower.	Tecumseh.	0.25	0.25	0.36	0.86	9.80	0.54	9.26	1.12
A 2638*	Cuckoo Crop Grower.	Plymouth.	0.59	0.13	0.15	0.87	9.45	0.52	8.93	1.11
		Av.	0.42	0.12	0.26	0.80	9.73	0.79	8.94	1.06
A 1853*	Dependo Grain Grower.	Nunica.	0.21	0.22	0.09	0.41	14.35	0.70	13.00	0.60
A 2150	Dependo Grain Grower.	Butternut.	0.14	0.09	0.21	0.52	15.20	0.50	13.65	0.78
A 2214	Dependo Grain Grower.	Plymouth.	0.32	0.14	0.26	0.44	14.15	0.60	14.70	0.52
A 2373	Dependo Grain Grower.	Morenci.	0.24	0.15	0.30	0.69	14.17	1.38	13.55	1.08
A 2482	Dependo Grain Grower.	Manchester.	0.23	0.12	0.17	0.52	14.80	1.18	12.79	0.58
A 2569*	Dependo Grain Grower.	Azalia.	0.16	0.12	0.16	0.44	14.43	0.38	13.62	0.80
A 2602*	Dependo Grain Grower.	Carleton.	0.14	0.10	0.14	0.38	14.10	0.58	13.52	0.60
		Av.	0.21	0.14	0.18	0.53	14.46	0.77	13.69	0.71
A 2122	Dreadnought Fertilizer.	Decatur.	1.18	0.32	0.40	1.65	9.80	1.88	8.00	2.00
A 2454	Dreadnought Fertilizer.	St. Johns.	1.17	0.18	0.24	1.59	10.16	2.06	7.92	1.83
A 2625*	Dreadnought Fertilizer.	Tecumseh.	1.06	0.38	0.38	1.82	9.75	1.32	8.43	2.58
		Av.	1.14	0.29	0.34	1.77	9.91	1.76	8.15	1.94
A 2431	Flamingo Ammoniated Superphosphate.	Richmond.	1.60	0.43	0.20	2.23	14.45	1.20	12.00	2.12
		Av.	1.60	0.43	0.20	2.23	14.45	1.20	12.00	2.12
A 1841*	Half and Half Wheat Fertilizer.	Coopersville.	0.36	0.07	0.10	0.41	10.30	0.55	8.00	0.60
A 1903*	Half and Half Wheat Fertilizer.	Clarksville.	0.16	0.12	0.18	0.46	8.45	1.12	9.75	0.63
A 2480	Half and Half Wheat Fertilizer.	Manchester.	0.30	0.15	0.18	0.63	10.63	1.10	7.33	0.81
		Av.	0.27	0.11	0.10	0.54	9.80	0.92	8.07	0.68

FERTILIZER ANALYSES

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A 1801. A 1802. A 1880. A 2303 A 2375 A 2567.	Penguin Ammoniated Superphosphate. Penguin Ammoniated Superphosphate. Penguin Ammoniated Superphosphate. Penguin Ammoniated Superphosphate. Penguin Ammoniated Superphosphate. Penguin Ammoniated Superphosphate.	Grand Rapids Clarksville Clarksville Azalia. Hemlock. Azalia.	'G 'F 'F 'F 'F 'F	0.98 0.34 0.41 1.23 1.11 0.92	0.35 0.18 0.18 0.39 0.43 0.23	0.36 0.19 0.20 0.25 0.30 0.24	1.65 1.09 0.71 1.87 1.84 1.39	12.35 13.30 13.80 12.50 12.90 11.15	0.92 1.04 1.06 1.06 2.02 0.74	10.00 11.43 12.26 12.74 11.46 10.41
A 1971. A 1975.	Phosphate and Potash Mixture 10-1. Phosphate and Potash Mixture 10-1.	Imlay City. Hudsonville.	'G 'F 'F	0.83	0.29	0.26	1.36	12.66 11.55 11.05	1.14 0.98 0.70	11.52 10.00 10.35
A 1953. A 2003.	Phosphate and Potash Mixture 12-1. Phosphate and Potash Mixture 12-1.	Ruth. Carleton.	'G 'F 'F	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	11.30 13.70 14.10	0.84 1.24 0.80	10.46 12.00 13.30
A 2163 A 2216. A 2624.	Special Fish Guano Special Fish Guano Special Fish Guano	Grand Haven. Plymouth. Tecumseh.	'G 'F 'F	0.28 0.71 0.49	0.09 0.09 0.20	0.25 0.24 0.19	0.82 1.04 0.88	12.50 10.83 13.15	0.42 0.82 1.60	11.00 12.08 10.01
A 1925. A 1927. A 2108 A 2343 A 2378 A 2626.	Special Wheat Grower. Special Wheat Grower. Special Wheat Grower. Special Wheat Grower. Special Wheat Grower. Special Wheat Grower.	Perrinton Middleton. Osago Osago. Hemlock. Tecumseh.	'G 'F 'F 'F 'F 'F	0.49 0.57 0.57 0.33 0.47 0.46	0.13 0.17 0.25 0.21 0.25 0.14	0.23 0.17 0.22 0.27 0.22 0.12	0.85 0.82 1.04 0.81 0.94 0.94	12.10 13.10 13.55 13.60 14.90 13.60	0.95 0.58 1.60 0.48 1.10 1.02	11.21 12.00 12.52 11.95 13.12 13.80 13.55
A 1854. A 2448.	Wheat, Oats and Barley Fertiliser. Wheat, Oats and Barley Fertiliser.	Nunica. Laingburg.	'G 'F 'F	0.48 0.52 0.49	0.20 0.23 0.17	0.22 0.16 0.22	0.90 0.82 0.88	13.93 10.10 11.25	1.01 0.85	12.92 8.00 9.15
A 2123	Wonder Worker Guano	Decatur.	'G 'F 'F	0.51 0.51	0.20 0.23	0.19 0.31	0.90 0.82 1.05	10.68 11.35	1.19 0.94	9.44 8.00 10.41
A 1781 A 1881. A 1899. A 2037 A 2049 A 2038 A 2287.	Smith Agricultural Chemical Co., Columbus, Ohio 14% Acid Phosphate. 14% Acid Phosphate. 14% Acid Phosphate. 14% Acid Phosphate. 14% Acid Phosphate. 14% Acid Phosphate.	Bad Axe Fillmore Center. Allgans Holland Wayland Nunica. Maybee.	'G 'F 'F 'F 'F 'F 'F	..... ..... ..... ..... ..... ..... .....	..... ..... ..... ..... ..... ..... .....	..... ..... ..... ..... ..... ..... .....	..... ..... ..... ..... ..... ..... .....	15.60 16.05 17.70 15.65 15.50 16.20 15.25	0.76 1.34 1.08 0.96 1.16 1.04	14.00 14.71 16.05 16.62 14.60 15.36 14.21
			Av.	16.00	1.03	14.97				

* Fall Samples.
* Abbreviations for Guaranteed and Found. * Duplicates of Sample A 1908.

EXPERIMENT STATION BULLETIN

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid		Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble		Available
Smith Agricultural Chemical Co.—Cont.								
A 1879*	16% Acid Phosphate.	Fillmore Center.						16.00
A 1882*	16% Acid Phosphate.	Fillmore Center.						18.10
A 2204	16% Acid Phosphate.	Beech.						18.85
A 2235	16% Acid Phosphate.	Wayne.						17.55
		Av.						16.51
								17.85
								16.89
								17.31
A 1784	Ammoniated Phosphate and Potash.	Bad Axe.	0.26	0.09	0.22	0.80	9.80	8.00
A 1864*	Ammoniated Phosphate and Potash.	Nashville.	0.23	0.16	0.39	0.57	11.70	8.74
A 2047	Ammoniated Phosphate and Potash.	Wayland.	0.39	0.23	0.21	0.78	11.25	1.06
A 2061	Ammoniated Phosphate and Potash.	Nunica.	0.15	0.19	0.27	0.61	7.90	10.64
A 2063	Ammoniated Phosphate and Potash.	Holland.	0.27	0.17	0.26	0.86	10.00	9.95
A 2205	Ammoniated Phosphate and Potash.	Beech.	0.18	0.30	0.24	0.70	9.65	0.85
		Av.	0.25	0.19	0.27	0.71	10.05	6.66
								8.74
								1.00
								1.00
A 2508	Corn, Oats and Wheat Fertilizer.	Parma.	0.86	0.33	0.30	1.60	10.55	8.86
								8.00
								9.51
A 2437	Crop Producer.	Almont.	0.93	0.41	0.33	1.67	15.55	1.04
								13.38
A 2286	General Crop.	Maybee.	0.31	0.30	0.29	0.80	11.80	12.00
A 2438	General Crop.	Almont.	0.17	0.28	0.33	0.78	12.10	10.00
		Av.	0.24	0.29	0.31	0.84	11.95	10.58
								10.77
A 2436	Grain Grower.	Almont.	0.51	0.16	0.10	0.80	16.35	15.00
A 2642*	Grain Grower.	Beech.	0.30	0.15	0.04	0.49	16.05	15.19
		Av.	0.40	0.16	0.07	0.63	16.50	15.63
								15.41
A 1783	Potash Formula.	Bad Axe.	0.07	0.10	0.25	0.40	9.90	8.00
A 2046	Potash Formula.	Wayland.	0.02	0.09	0.28	0.42	11.55	9.02
A 2060	Potash Formula.	Nunica.	0.08	0.10	0.26	0.30	9.50	8.32
A 2064	Potash Formula.	Holland.	0.04	0.15	0.35	0.44	10.30	8.78
A 2207	Potash Formula.	Beech.	0.24	0.23	0.16	0.54	9.70	1.52
A 2236	Potash Formula.	Wayne.	0.01	0.14	0.30	0.45	11.00	8.40
		Av.	0.08	0.14	0.26	0.48	10.32	0.82
								1.70
								1.52

A 1782	Wheat Maker and Seeding Down.	0.05	0.10	0.25	0.40	13.50	1.02	12.48	.....
A 1865*	Wheat Maker and Seeding Down.	0.10	0.10	0.32	0.42	18.00	3.10	12.90	.....
A 1890*	Wheat Maker and Seeding Down.	0.04	0.14	0.30	0.48	14.55	2.00	12.55	.....
A 2038	Wheat Maker and Seeding Down.	0.23	0.11	0.23	0.38	14.10	1.44	12.66	.....
A 2048	Wheat Maker and Seeding Down.	0.23	0.20	0.27	0.69	13.50	1.46	12.04	.....
A 2050	Wheat Maker and Seeding Down.	0.12	0.11	0.24	0.47	14.50	1.56	12.94	.....
A 2056	Wheat Maker and Seeding Down.	0.07	0.25	0.16	0.48	13.90	1.30	12.60	.....
A 2261	Wheat Maker and Seeding Down.	0.03	0.14	0.24	0.41	14.35	1.46	12.89	.....
J. L. & H. Stadler Rendering & Fertilizer Co., Cleveland, Ohio									
A 1773	Ammoniated Acid Phosphate.	0.33	0.14	0.32	0.79	10.85	0.96	10.00	.....
A 2299	Ammoniated Acid Phosphate.	0.31	0.19	0.27	1.06	11.35	1.06	9.89	.....
A 2560*	Ammoniated Acid Phosphate.	0.48	0.16	0.37	0.91	12.25	0.80	11.45	.....
Bad Axe.									
A 2282	Bone Meal and Acid Phosphate.	0.37	0.16	0.29	0.82	11.48	0.94	10.54	.....
A 2553*	Bone Meal and Acid Phosphate.	0.48	0.77	0.39	1.40	19.78	8.50	10.00	.....
	Bone Meal and Acid Phosphate.	0.54	0.52	0.68	1.74	20.58	10.63	9.95	.....
General Crop Grower.									
	Grain Grower.	0.51	0.65	0.53	1.69	20.18	9.57	10.61	.....
	Grain Grower.	.....	.....	.....	1.60	.....	.....	10.00	1.00
	Grain Grower.	.....	.....	.....	1.60	.....	.....	10.00	.....
A 2246	Harvest King.	0.22	0.25	0.32	0.80	10.70	1.16	9.00	1.00
A 2316	Harvest King.	0.37	0.27	0.50	1.14	10.25	0.90	9.54	1.10
A 2347	Harvest King.	0.42	0.18	0.31	0.91	11.65	1.60	9.35	1.13
Ida.									
A 2493	Pure Bone Meal.	0.34	0.23	0.38	0.95	10.87	1.22	9.65	1.12
	Pure Bone Meal.	1.07	0.80	1.13	3.00	21.35	.....	.....	.....
Dryden.									
A 1775	Vegetable and Grain Grower.	0.36	0.15	0.32	0.80	11.50	1.02	10.00	0.50
A 2247	Vegetable and Grain Grower.	0.23	0.24	0.41	0.83	11.70	1.24	10.48	0.56
A 2294	Vegetable and Grain Grower.	0.38	0.30	0.33	1.01	11.85	1.18	10.67	0.64
A 2555*	Vegetable and Grain Grower.	0.37	0.22	0.45	1.04	11.55	1.20	10.35	0.53
A 2616*	Vegetable and Grain Grower.	0.42	0.20	0.33	0.95	11.90	1.44	10.46	0.54
Bad Axe.									
A 2281	Vegetable Manure.	0.35	0.22	0.37	0.94	11.70	1.22	10.48	0.55
A 2291	Vegetable Manure.	0.57	0.32	0.49	1.38	13.90	1.80	12.00	.....
A 2348	Vegetable Manure.	0.73	0.40	0.40	1.58	13.90	1.80	12.10	.....
	Vegetable Manure.	0.72	0.37	0.47	1.56	13.50	1.96	11.54	.....
Nicholas Swartz, Grand Haven, Mich.									
A 2162	Celery Hustler.	0.67	0.36	0.46	1.49	13.76	1.85	11.91	.....
	Celery Hustler.	.....	6.05	2.67	8.73	5.85	1.90	3.61	.....
	Celery Hustler.	0.01	.....	.....	.....	.....	.....	3.95	.....

* Fall Samples.

Abbreviations for Guaranteed and Fosad.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash Totals
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Swift & Company, Chicago, Ill.										
A 2167	Bean and Grain Grower.....	Muskegon..... ^{'G}	0.04	0.28	0.38	0.82	12.40	1.06	8.00	3.00
A 2361	Bean and Grain Grower.....	Adrian..... ^{'F}	0.51	0.19	0.30	0.70	9.50	1.38	11.34	2.87
A 2383	Bean and Grain Grower.....	Bay City.....	0.06	0.40	0.42	1.00	10.00	1.30	8.12	2.80
A 2409	Bean and Grain Grower.....	Chesaning.....	0.48	0.17	0.12	0.77	9.15	1.30	7.85	2.01
		Av.	0.27	0.26	0.31	0.84	10.26	1.26	9.00	2.47
A 1752	Bean and Sugar Beet Grower.....	Saginaw..... ^{'G}	0.39	0.26	0.18	0.82	14.05	1.36	12.00	1.00
A 1937*	Bean and Sugar Beet Grower.....	Merrill..... ^{'F}	0.18	0.27	0.42	0.87	16.20	1.12	12.60	1.01
		Av.	0.29	0.26	0.30	0.85	15.12	1.24	13.88	0.88
A 2077	Champion Wheat and Corn Grower.....	Watervliet..... ^{'G}	0.08	0.97	0.65	1.65	14.15	1.62	12.53	2.00
A 2301	Champion Wheat and Corn Grower.....	Milan..... ^{'F}	0.43	0.45	0.33	1.21	15.30	3.06	12.24	1.50
		Av.	0.26	0.71	0.49	1.46	14.73	2.34	12.39	2.03
A 2143	Clay Soil Special.....	Coloma..... ^{'G}	0.86	0.41	0.29	1.65	13.90	1.04	12.86	1.56
A 2314	Clay Soil Special.....	Coldwater..... ^{'F}	0.47	0.77	0.26	1.50	13.95	2.31	11.64	2.31
A 2315	Clay Soil Special.....	Quincy.....	0.76	0.50	0.41	1.67	13.58	1.69	11.89	2.03
		Av.	0.70	0.56	0.32	1.58	13.81	1.68	12.13	2.03
A 1770	Complete Fertilizer.....	Minden City..... ^{'G}	0.33	0.30	0.17	0.82	10.00	1.66	8.00	1.00
A 1785	Complete Fertilizer.....	Casa City..... ^{'F}	0.37	0.26	0.10	0.80	11.30	1.04	8.34	0.87
A 1805	Complete Fertilizer.....	Saranac.....	0.33	0.29	0.20	0.82	9.75	1.80	10.26	0.88
A 1835*	Complete Fertilizer.....	Janestown.....	0.05	0.28	0.33	0.66	7.25	1.12	7.95	1.08
A 1894*	Complete Fertilizer.....	Dorr.....	0.30	0.37	0.17	0.86	11.80	1.86	6.13	0.91
A 2328	Complete Fertilizer.....	Hillsdale.....	0.20	0.33	0.23	0.90	10.55	1.94	9.94	1.02
A 2328*	Complete Fertilizer.....	Hillsdale.....	0.38	0.38	0.15	0.91	9.88	2.11	7.77	1.06
A 2531*	Complete Fertilizer.....	Hendling.....	0.33	0.38	0.16	0.87	9.90	1.37	8.57	0.99
A 2552*	Complete Fertilizer.....	Ann Arbor.....	0.33	0.36	0.29	0.98	9.25	0.34	8.91	1.17
A 2595*	Complete Fertilizer.....	Ida.....	0.30	0.30	0.15	0.81	9.45	1.44	8.01	0.99
		Av.	0.30	0.33	0.21	0.84	9.82	1.47	8.45	0.98
A 1885*	Diamond "K" Grain Grower.....	Sparta..... ^{'G}	0.31	0.39	0.17	0.89	14.80	2.16	12.00	1.00
A 1893*	Diamond "K" Grain Grower.....	Dorr..... ^{'F}	0.23	0.40	0.16	0.87	14.03	3.61	10.52	0.98
A 2111	Diamond "K" Grain Grower.....	Plainwell.....	0.41	0.26	0.26	0.90	13.90	1.27	12.63	1.02
A 2111	Diamond "K" Grain Grower.....	Benton Harbor.....	0.41	0.26	0.16	0.86	13.90	1.36	12.54	1.01

FERTILIZER ANALYSES

A 2300	Diamond "K" Grain Grower.	Milan.....	0.30	0.33	0.26	0.08	14.45	1.44	13.01	1.34
A 2311*	Diamond "K" Grain Grower.	Walta.....	0.26	0.34	0.15	0.75	12.80	1.70	11.10	1.02
A 2317*	Diamond "K" Grain Grower.	Belleville.....	0.34	0.34	0.16	0.84	14.85	1.68	13.17	0.98
A 2023*	Diamond "K" Grain Grower.	Dundee.....	0.24	0.37	0.19	0.80	13.95	1.92	12.03	1.05
		Av.	0.31	0.34	0.19	0.84	14.09	1.88	12.21	1.06
	Diamond "S" Phosphate.	.....	'G						10.00	
A 2385	Diamond "U" Fruit and Vegetable Grower.	Bay City.....	0.34	1.96	0.86	3.29	9.85	1.44	8.00	3.00
		'F				3.06			8.41	3.09
	Garden City Phosphate.	Bad Axe.....	'G						14.00	
A 1947*	Garden City Phosphate.	Tyre.....					17.65	1.14	16.51	
A 1956*	Garden City Phosphate.	Muskegon.....					16.20	1.28	14.92	
A 2169	Garden City Phosphate.	Eden.....					17.60	2.76	14.84	
A 2457	Garden City Phosphate.	.....					16.84	1.14	15.70	
		Av.					17.07	1.58	15.49	
A 2068	Ground Beef Bone Fertilizer.	Fennville.....	'G			\$.06	\$7.00			
A 2076	Ground Beef Bone Fertilizer.	Watervliet.....	'F			2.05	26.95			
A 2084	Ground Beef Bone Fertilizer.	Glendora.....	0.26	1.14	0.65	1.98	27.00			
A 2166	Ground Beef Bone Fertilizer.	Muskegon.....	0.40	1.21	0.40	2.22	27.20			
A 2384	Ground Beef Bone Fertilizer.	Bay City.....	0.29	1.19	0.63	2.12	27.60			
A 2551	Ground Beef Bone Fertilizer.	Ann Arbor.....	0.37	1.22	0.69	1.80	24.67			
			0.37	0.94	0.49	1.95	27.10			
		Av.	0.34	1.10	0.53	2.02	26.75			
A 1760	High Grade Acid Phosphate.	Minden City.....	'G							
A 2067	High Grade Acid Phosphate.	Fennville.....	'F				17.80	1.16	16.00	
A 2105	High Grade Acid Phosphate.	Allegan.....					18.00	1.18	16.94	
A 2145	High Grade Acid Phosphate.	Coloma.....					18.10	2.48	16.42	
A 2313	High Grade Acid Phosphate.	Coldwater.....					17.03	1.30	16.86	
A 2314*	High Grade Acid Phosphate.	Fulton.....					19.11	1.82	16.11	
A 2630*	High Grade Acid Phosphate.	Ypsilanti.....					19.10	1.34	17.76	
							18.35	1.42	16.93	
		Av.					18.32	1.53	16.79	
A 2002	Pulverized Sheep Manure.	Grand Rapids.....	'G			1.65			1.00	1.50
A 2112	Pulverized Sheep Manure.	Kalamazoo.....	'F			1.81	1.55	0.18	1.37	2.80
A 2386	Pulverized Sheep Manure.	Bay City.....	0.16	0.43	1.22	1.83	2.00	0.26	1.74	3.09
			0.11	0.45	1.27	1.95	1.40	0.22	1.18	2.15
		Av.	0.26	0.45	1.24	1.86	1.65	0.22	1.43	2.68
	Special Superphosphate.	.....	0.18	0.44	1.24	1.66			8.00	1.00
		'G								
A 2108	Superphosphate.	Muskegon.....	'G			1.65			8.00	\$.00
A 2382	Superphosphate.	Bay City.....	'F			1.14	10.95	0.96	9.99	1.42
A 2444	Superphosphate.	Lapeer.....	0.09	0.69	0.36	1.24	11.55	2.64	8.91	1.14
A 2456	Superphosphate.	Eden.....	0.80	0.44	0.43	1.76	11.15	1.70	9.45	1.62
			0.70	0.37	0.56	1.63	10.40	1.30	9.10	1.64
		Av.	0.19	0.57	0.45	1.44	11.01	1.65	9.26	1.46

ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Swift & Company—Cont.										
A 1771	Tankage and Bone Phosphate.	Minden City.	0.41	0.28	0.19	0.88	13.85	1.46	18.00	
A 1837	Tankage and Bone Phosphate.	Jamestown.	0.23	0.40	0.10	0.73	13.68	3.43	12.39	
A 1861	Tankage and Bone Phosphate.	Caledonia.	0.44	0.35	0.07	0.86	13.88	2.16	10.25	
A 1883	Tankage and Bone Phosphate.	Hamilton.	0.40	0.29	0.22	0.91	14.40	1.28	11.72	
A 2045	Tankage and Bone Phosphate.	Ross.	0.33	0.31	0.23	0.87	14.10	1.22	13.12	
A 2069	Tankage and Bone Phosphate.	Fennville.	0.38	0.28	0.18	0.84	14.55	2.06	12.88	
A 2092	Tankage and Bone Phosphate.	Three Oaks.	0.36	0.29	0.18	0.83	14.40	1.10	12.49	
A 2104	Tankage and Bone Phosphate.	Allegan.	0.40	0.28	0.18	0.86	14.40	1.74	13.30	
A 2213	Tankage and Bone Phosphate.	Newberg.	0.36	0.27	0.20	0.83	14.95	1.64	12.66	
A 2515	Tankage and Bone Phosphate.	Fulton.	0.33	0.29	0.08	0.70	14.55	1.64	12.91	
A 2527	Tankage and Bone Phosphate.	Hillsdale.	0.55	0.26	0.09	0.90	14.30	1.90	12.40	
	Truck Fertilizer.	Av.	0.38	0.30	0.16	0.84	14.27	1.78	12.49	
						2.47			8.00	1.00
A 1863	Wheat and Rye Special 2-10.	Caledonia.	0.75	0.46	0.27	1.65	12.00	1.86	10.00	
A 1970	Wheat and Rye Special 2-10.	North Branch.	0.09	0.39	0.22	1.48	12.00	1.64	10.36	
A 2612	Wheat and Rye Special 2-10.	Waltz.	0.69	0.35	0.28	1.32	11.43	1.48	9.95	
		Av.	0.71	0.40	0.26	1.37	11.81	1.66	10.15	
A 2532	1½-20 Bone Meal.	Reading.	0.10	0.38	1.06	1.54	20.00			
A 2618	1½-20 Bone Meal.	Belleville.	0.18	0.78	0.42	1.38	20.60			
A 2622	1½-20 Bone Meal.	Dundee.	0.24	0.53	0.45	1.22	21.70			
		Av.	0.17	0.56	0.65	1.38	20.77			
A 1836	2¼-29 Bone Meal.	Jamestown.	0.35	1.14	0.50	1.86	29.00			
A 1862	2¼-29 Bone Meal.	Caledonia.	0.37	1.12	0.50	1.99	30.50			
		Av.	0.36	1.13	0.50	1.99	29.85			
A 1802	1-8-2 Fertilizer.	Dorr.	0.35	0.29	0.22	0.86	10.40	1.98	8.00	2.00
A 1906	1-8-2 Fertilizer.	Lake Odessa.	0.38	0.25	0.28	0.91	11.33	2.62	8.42	1.67
A 2183	1-8-2 Fertilizer.	Merrill.	0.46	0.15	0.20	0.81	10.65	1.46	8.71	1.64
A 2188	1-8-2 Fertilizer.	Middleton.	0.39	0.19	0.22	0.80	10.10	1.20	9.09	1.71
A 2196	1-8-2 Fertilizer.	Itasca.	0.42	0.20	0.19	0.81	10.85	1.00	8.95	2.19
A 2654	1-8-2 Fertilizer.	Ann Arbor.	0.36	0.24	0.22	0.80	9.80	2.31	7.49	1.93
		Av.	0.39	0.23	0.22	0.85	10.51	1.91	8.60	1.75

FERTILIZER ANALYSES

A 2409	1-9-5 Fertilizer.....	Birch Run.....	'G	0.27	0.31	0.42	0.89	10.15	0.94	8.00	5.00
			'F				1.00			9.21	5.33
A 1946*	1-10-0 Fertilizer.....	Bad Axe.....	'G	0.22	0.23	0.21	0.82	11.05	0.91	10.00	
A 1973*	1-10-0 Fertilizer.....	Capric.....	'F	0.42	0.20	0.18	0.66	11.50	0.73	10.11	
A 2396	1-10-0 Fertilizer.....	Millington.....		0.32	0.36	0.20	0.88	12.05	1.06	10.72	
			Av.	0.32	0.28	0.20	0.80	11.54	0.93	10.61	
A 2110	2-10-0 Fertilizer.....	Plainwell.....	'G	0.60	0.30	0.32	1.65	11.70	1.08	10.00	
			'F				1.28			10.02	
A 2144	5-8-0 Fertilizer.....	Coloma.....	'G	1.80	0.84	0.98	4.19	12.20	3.10	8.00	
			'F				3.68			9.10	
United Chemical & Organic Products Co., Chicago, Ill.											
Calumet Brands											
A 2252	Acid Phosphate.....	Petersburg.....	'G					18.35	1.90	14.00	
A 2360	Acid Phosphate.....	Adrian.....	'F					19.65	4.96	16.39	
A 2367	Acid Phosphate.....	Deerfield.....						20.63	9.26	14.50	
A 2587*	Acid Phosphate.....	Petersburg.....						18.25	1.90	11.26	
			Av.					10.20	3.79	13.41	
A 2492	Beet Fertilizer.....	Dryden.....	'G	0.31	0.17	0.31	0.80	13.00	3.72	10.00	0.59
			'F				0.70			10.18	0.63
A 1792	Bone Phosphate and Potash Mixture.....	Imlay City.....	'G	0.22	0.25	0.20	0.40	14.80	2.64	10.00	1.00
A 2017	Bone Phosphate and Potash Mixture.....	Jamestown.....	'F	0.03	0.24	0.28	0.55	14.02	3.10	12.16	0.53
A 2119	Bone Phosphate and Potash Mixture.....	Niles.....		0.21	0.21	0.30	0.73	14.35	2.53	11.82	0.48
A 2344	Bone Phosphate and Potash Mixture.....	Petersburg.....		0.23	0.33	0.30	0.86	15.05	4.04	11.82	0.68
A 2546	Bone Phosphate and Potash Mixture.....	Pittsford.....		0.23	0.27	0.24	0.74	14.40	2.80	11.01	0.64
A 2588*	Bone Phosphate and Potash Mixture.....	Petersburg.....		0.29	0.24	0.35	0.88	15.75	5.72	1.00	0.71
			Av.	0.20	0.25	0.30	0.75	14.88	3.47	11.41	0.68
A 1790	Coburn Special.....	Imlay City.....	'G	0.13	0.10	0.47	0.60	11.80	2.60	8.00	
			'F				0.70			9.20	
A 2253	Coburn Special and Potash.....	Petersburg.....	'G	0.21	0.30	0.22	0.60	12.50	1.90	8.50	0.50
A 2366	Coburn Special and Potash.....	Deerfield.....	'F	0.28	0.25	0.33	0.86	13.00	2.04	10.96	0.57
A 2586*	Coburn Special and Potash.....	Petersburg.....		0.10	0.18	0.37	0.74	12.10	2.02	10.08	0.59
			Av.	0.23	0.24	0.31	0.78	12.54	1.90	10.55	0.56
A 2008	Corn and Wheat Grower.....	Jamestown.....	'G	0.44	0.30	0.12	0.80	15.30	3.38	10.00	
A 2128	Corn and Wheat Grower.....	Lawton.....	'F	0.28	0.27	0.32	0.86	15.10	2.44	11.02	
A 2394	Corn and Wheat Grower.....	Millington.....		0.21	0.30	0.41	0.98	14.10	2.60	12.66	
			Av.	0.31	0.31	0.28	0.90	14.84	2.81	12.03	

FERTILIZER ANALYSES

A 2357*	Red Cross 14 %	Milan	Av.					18.75	1.86	16.99
A 2478	Rescue Fertilizer	Urania	'G 'F	0.94	0.30	0.53		18.73	2.74	15.98
A 2412	Richumus Fertilizer	Erie	'G	0.22	0.11	0.12	1.66	16.45	3.60	17.00
A 2010*	Richumus Fertilizer	Watts	'F	0.01	0.15	0.33	1.85			12.85
A 2477	Sure Grain Producer	Urania	'G	0.11	0.13	0.23	0.41	16.50	1.72	19.00
A 2465	Sure Grain Producer	Clinton	'F	0.40	0.42	0.10	0.45	13.45	0.76	14.78
A 2634*	Sure Grain Producer	Manchester		0.19	0.12	0.22	0.83	14.50		12.09
				0.34	0.20	0.38	1.01			14.14
	Resin-Monumental Brands		Av.	0.41	0.28	0.26	0.47	14.98	1.24	13.74
	14 % Acid Phosphate		'G				0.82	19.45		13.00
A 1874*	16 % Acid Phosphate	Coopersville	'G				1.01	19.45	3.60	15.85
A 2309	16 % Acid Phosphate	Batavia	'F				0.83	17.65	1.10	16.41
A 2475	16 % Acid Phosphate	Lansing					1.01	14.50	0.36	14.14
			Av.				0.95	17.20	1.72	15.43
	20 % Acid Phosphate		'G							14.00
	Big Giant Phosphate		'G							16.00
	Farmers' Success	Lansing	'G 'F	0.23	0.27	0.34	0.82	19.50	0.80	18.70
A 2473	Fenhumus Fertilizer		'G				0.84	18.92	1.12	17.80
							0.41	20.55	1.76	18.79
	General Favorite	Batavia	'G 'F	1.48	0.02	0.17	1.65	19.66	1.23	18.43
A 2307	Grain Fertilizer	Lansing	'G 'F	0.31	0.30	0.29	1.67			20.00
A 2574	Phosphate and Bone Meal		'G				1.15			8.00
	Reliable Wheat and Corn Fertilizer	Batavia	'G	0.30	0.29	0.24	0.82	9.50	0.80	8.00
A 2308	Reliable Wheat and Corn Fertilizer	Lansing	'F	0.17	0.34	0.33	0.90	16.65	0.80	1.00
A 2472							0.82			1.45
			Av.	0.24	0.31	0.28	0.83	10.30	0.99	12.00
A 1875*	Royal Grain Grower	Coopersville	'G					14.70	1.00	13.70
	Special Plant Food		'G							2.00

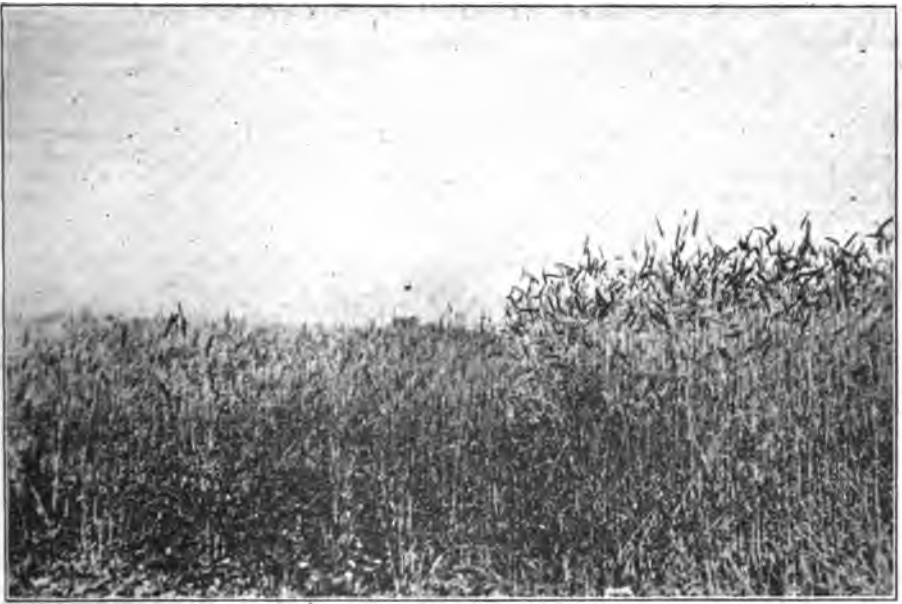
ANALYSES OF COMMERCIAL FERTILIZER FOR 1918, EXPRESSED IN PARTS IN ONE HUNDRED—Continued

Laboratory No.	Manufacturer and Trade Name	Sampled at	Nitrogen			Phosphoric Acid			Potash Total
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble	Available	
A 2470	Wolcott Packing Co., Flint, Michigan	Blood and Bone.....	1.78	2.05	0.70	4.00 4.59	20.05	8.00 14.77	
		Tankage.....				1.85	24.00		
		Av.....							
A 1802 A 2133 A 2134 A 2406 A 2408	The Waichert Fertilizer Co., Dayton, Ohio	EE Ammonia Special.....	0.20	0.35	0.35	0.80	13.80	10.00	
		EE Ammonia Special.....	0.23	0.45	0.44	1.12	14.42	11.04	
		EE Ammonia Special.....	0.25	0.49	0.41	1.08	15.43	12.50	
		EE Ammonia Special.....	0.32	0.49	0.54	1.35	15.75	13.20	
		Birch Run.....				1.35	15.75	12.52	
A 2378 A 2545	16% Phosphate 10% Phosphate.....	Av.....	0.25	0.43	0.43	1.11	12.47	12.49	
		Hemlock.....					18.08	16.00	
		Moungouery.....					18.05	17.18	
A 1803 A 1910* A 1926* A 2151 A 2154 A 2182 A 2187 A 2408 A 2544*	EE Raw Bone and Phosphate.....	Av.....					18.37	17.53	
		Lowell.....	0.09	0.23	0.14	0.40	12.90	8.00	
		Woodbury.....	0.20	0.22	0.13	0.55	14.50	11.70	
		Middletown.....	0.17	0.22	0.09	0.48	15.35	11.00	
		Sparta.....	0.14	0.20	0.15	0.49	13.45	13.03	
		Mulliken.....	0.10	0.20	0.17	0.40	13.00	12.80	
		Middletown.....	0.11	0.22	0.13	0.49	13.95	11.54	
		Hemlock.....	0.11	0.24	0.15	0.51	13.55	12.53	
		Channing.....	0.10	0.27	0.20	0.52	13.41	12.17	
		Moungouery.....	0.12	0.27	0.13	0.52	15.30	12.15	
A 1910* A 2132 A 2370 A 2440 A 2405	EE Spot Cash.....	Av.....	0.14	0.23	0.14	0.51	13.93	12.05	
		Fowler.....	0.20	0.23	0.38	0.80	13.15	8.00	
		Sparta.....	0.34	0.30	0.34	1.04	14.35	9.50	
		Hemlock.....	0.31	0.30	0.33	1.00	12.05	11.00	
		Perry.....	0.26	0.30	0.37	0.98	14.05	9.77	
A 2405	EE Spot Cash.....	Swartz Creek.....	0.29	0.30	0.33	0.98	11.02	10.61	
		Av.....	0.28	0.33	0.33	0.94	11.02	10.32	
							11.01	10.27	

MICHIGAN AGRICULTURAL COLLEGE

EXPERIMENT STATION

SOILS SECTION



Some fields do not produce satisfactory yields of wheat unless treated with phosphorus. On the right wheat growing on soil treated with 200 pounds per acre of acid phosphate, on the left no phosphate.

SOME INFORMATION AND SUGGESTIONS CONCERNING THE USE OF PHOSPHORUS

BY

M. M. McCOOL, G. M. GRANTHAM, C. E. MILLAR

EAST LANSING, MICHIGAN
1919



The Station

The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
Grayling, Crawford County, 80 acres deeded.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.

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SOME INFORMATION AND SUGGESTIONS CONCERNING THE USE OF PHOSPHORUS.

INTRODUCTION.

Phosphorus is known to have been used in Europe as early as 1653 for soil improvement. In this country its benefits were early recognized and the amount applied to the soil has steadily increased until it is made use of with safe margins of profit in all the older agricultural regions. Moreover, it has been found to be profitable on some of the more recently developed lands. Of course, there are several explanations for its wide popularity.

This report discusses terms used, forms in which phosphorus may be purchased; its effect on crop growth and on the soil; the time, manner and amount to apply; removal of phosphorus from Michigan farms; the amount of commercial phosphate required to make good this loss; soil composition; and some results obtained from the judicious use of phosphorus.

Terms Used. It is rather unfortunate, since it confuses some, that several terms are used in referring to this valuable element of plant-food. These are used somewhat loosely, but strictly speaking they convey a definite meaning to the chemist or to those who have some knowledge of chemistry. It is sometimes spoken of as phosphorus, as phosphoric acid, and as phosphate.

When it is stated, for example, that a substance contains 4.4 per cent of phosphorus it means the same thing as when it is said that it contains 10 per cent phosphoric acid. Thus, in order to express the phosphorus content of a substance as an equivalent amount of phosphoric acid it must be multiplied by 2.3 and in order to express the phosphoric acid content of a substance as an equivalent amount of phosphorus it must be multiplied by .44. Many farmers use the term phosphate in a very general or broad sense, all kinds of fertilizers, those containing only phosphorus as well as mixed goods, being spoken of as phosphates. The term phosphate as used in this report refers to one or all of the three carriers spoken of below.

Carriers of Phosphorus. There are three phosphates or carriers of phosphorus, aside from mixed goods, which are worthy of mention so far as Michigan agriculture is concerned, namely: raw rock phosphate, bone meal, and acid phosphate.

Raw rock phosphate or "floats" is found in natural deposits and has been extensively mined in South Carolina, Florida and Tennessee. Other deposits are also known to exist in Alabama, North Carolina, Nevada, Pennsylvania, Arkansas, Idaho, Wyoming, Utah and Montana. The

phosphorus occurring in this carrier is slow acting when applied to the soil and consequently it should be added in large quantities.

Finely ground bone or bone meal is obtained from packing and other slaughter houses and is somewhat more active in its effect on the crops than raw rock phosphate and therefore the applications consist of somewhat smaller amounts.

Acid phosphate, the most extensively used in Michigan, is derived chiefly from raw rock phosphate and is manufactured by adding about one ton of strong sulphuric acid to one ton of the floats. As a result of this mixture the acid is neutralized and the phosphorus is converted into a much more active or available condition. Bone meal may be treated in a similar manner. The product obtained is commonly spoken of as acidulated bone, or soluble bone and the phosphorus exists in the same form as it does when floats are treated with the acid.



Figure 1.—Alfalfa is an exacting crop requiring an abundance of lime and other elements of plant-food. The plants on the right are typical of those growing on limed sandy soil, those on the left were taken from the same soil to which had been applied lime and 300 pounds of acid phosphate per acre. Ingham County sandy soil.

Effect of Phosphorus on Crops. An application of phosphorus in suitable quantities to soils deficient in this plant-food element proves to be beneficial in several respects. It is known to increase tremendously the root production of plants, causing them to strike more deeply into the soil as well as to be more numerous in the surface soil. This has been

reported to be of value during periods of drouth, enabling the plant to draw upon larger areas of soil for water and elements of plant-food. It results in greater leaf and stem development, and aids materially in grain or seed formation and speeds up the maturity or shortens the length of the growing season. It may also raise the feeding value of the crops produced. It is maintained by agricultural writers that the most nutritious pastures in England and the best dairy pastures in France are those richest in phosphorus.

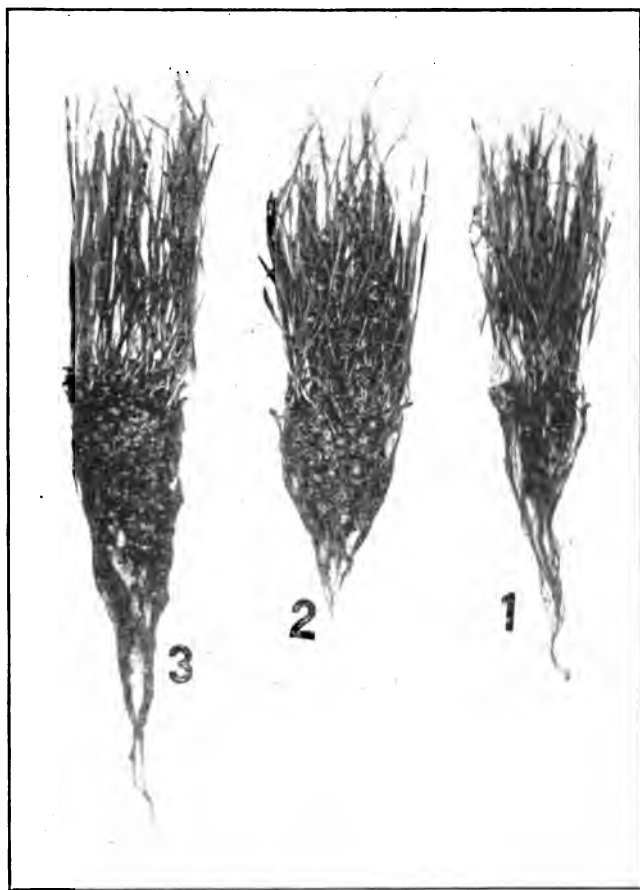


Figure 2.—The root development of plants is increased by available plant-food elements. No. 1 wheat grown in untreated soil. No. 2 wheat grown in soil receiving green manure. No. 3 wheat grown in soil treated with acid phosphate.

Effect of Phosphorus Carriers on Soils. Phosphate fertilizers do not injure the soil. Some farmers are reluctant to use these carriers of phosphorus because of the impression that they may prove valuable for a time and later lose their efficiency leaving the soil in a less

productive state than formerly, markedly increasing the need for lime, decreasing or "burning out" the organic matter and injuring the tilth of the soil. These are misconceptions as long and carefully conducted field tests, notably at the Rothamsted Agricultural Experiment Station, England, and at the Pennsylvania, Massachusetts, Ohio and Illinois Experiment Stations, have shown conclusively that the continued use of phosphorus on the land is a safe, sane and business like operation as measured by the increase in yield of the crops grown and the effect upon the soil. The lime content of the soil is not markedly changed by the use of either acid phosphate or bone meal. Inasmuch as raw rock phosphate or "floats" sometimes contains appreciable quantities of car-



Figure 3.—Wheat responds to phosphorus. On the right typical heads of wheat grown on untreated soil, on the left heads of wheat grown on the same soil treated with 200 pounds of acid phosphate.

bonate of lime, its use results in a lessening of the so-called acid or sour condition. Our investigations on the solubility of soils that have been treated with certain phosphates indicate that their presence decreases the rate of solubility of some of the mineral constituents and thus reduces the losses due to leaching.

Now with respect to the effect upon the tilth of the soil it is doubtless true that as a result of their application there is a tendency toward an improvement of the soil on account of the increase of the vegetable matter, if care is taken to conserve it. Of course, if rotation of crops and proper tillage are not practiced and the manure and crop residues not returned to the land the tilth of the fine textured soils will be impaired but not necessarily to greater extent with the fertilizer than without it.

Amount to Apply. The amount of phosphate fertilizer to apply to the soil depends upon the carrier and the kind of crops grown and the nature of the soil. The law of diminishing returns should always be considered, that is to say a small application of a phosphate fertilizer results in a greater percentage of increase of crop than does a larger one. This means, of course, that there is a limit to the profitable use of them, inasmuch as the cost of the fertilizer rises in direct proportion to the amount used; the rate of increase in the yield does not do so after a certain point is reached and, finally the value of the product becomes less than the cost of the fertilizer. Naturally those who cannot afford to take chances on the weather, fluctuation in prices, and other conditions should be somewhat more conservative in their use than others. The law of diminishing returns with respect to the use of fertilizers is illustrated in figure 4.

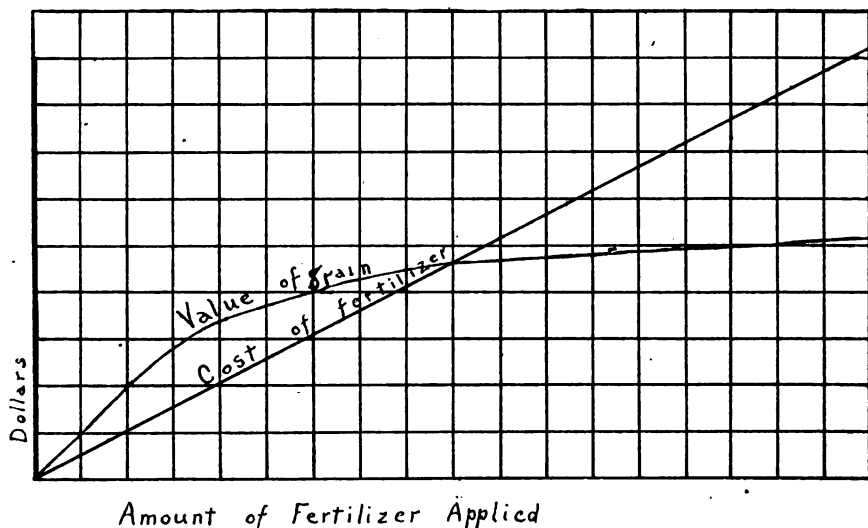


Figure 4.—The law of diminishing returns should be considered in using fertilizers. The greatest returns on the investment may not be obtained from very large applications.

Where rock phosphate, the slow acting form, is utilized as a source of phosphorus, the applications range in amount from 1000 to 2000 pounds per acre, the slow availability being made up for in quantity. It is generally agreed that this material is most effective when applied to the soil along with barnyard manure, green manures, or crop residues. If the soil is low in organic matter the larger applications are usually advisable.

Bone meal, being somewhat more active than the floats, is used in smaller quantities. Where it is applied to the soil to increase the yield of small grains and grasses, 300 to 600 pound applications per acre are made and 1000 or more pounds for the larger cash crops. This form is not extensively used in Michigan.

The active form or acid phosphate is applied to the small grains and grasses in amounts ranging from 80 to 300 pounds per acre, the average

being about 200 pounds; for potatoes, beets and tomatoes, 300 to 500 pounds are usually considered ample while somewhat larger amounts are sometimes utilized for the production of cabbage, onions and celery. It is generally considered to be inadvisable to mix acid phosphate with either caustic lime or wood ashes and if mixed with nitrate of soda the mixture should be applied immediately.

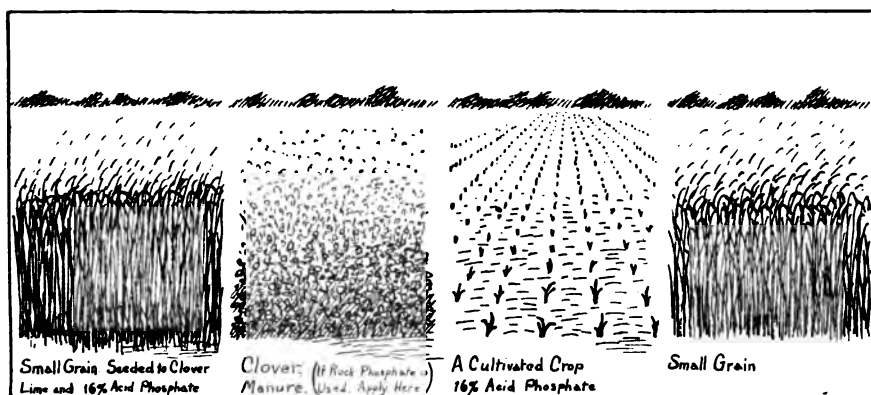
Where to Apply. It is usually advisable to fertilize the rotation. Phosphates are fixed or held by the soil until utilized by growing plants, although when acid phosphate is applied to light sands it may be washed downward to some extent. This means that crops following in the rotation are benefited by phosphorus left by previous crops. It is generally considered that about two-thirds the cost of the application of acid phosphate should be charged to the first crop and the remainder to those that follow in the rotation. In case of the floats these figures do not apply and it is usually the practice to add them to the clover or other sod before plowing and repeat the application in from four to six years, depending upon the size of the application and the crops grown. It is advisable to apply the bone meal or acid phosphate to the grain crops in the rotation as illustrated by figures 6 and 7. In several sections it is becoming more



Figure 5.—Oats growing on Van Buren Co. sandy soil. On the left 1000 pounds of rock phosphate per acre were applied to corn before the oats. On the right 2000 pounds were added. It pays to use the rock phosphate freely.

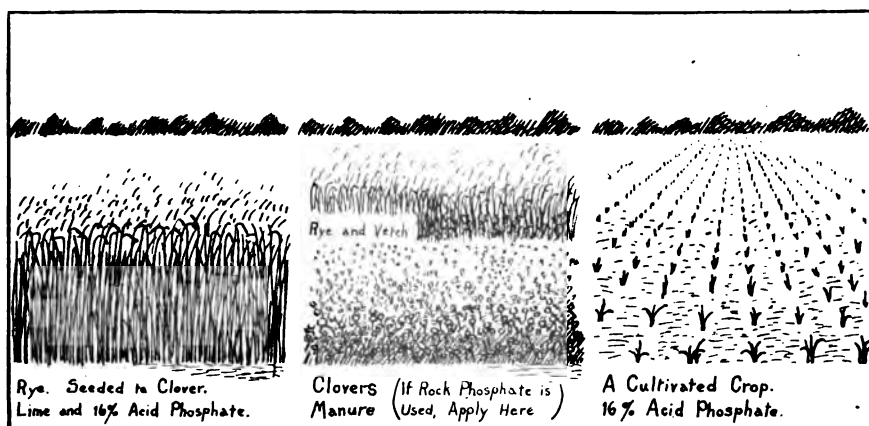
and more difficult to obtain suitable stands of clover with small grains, as a result proper rotation of crops becomes difficult. It is doubtless true that the lack of both lime and phosphorus in the soil accounts in a large measure for this undesirable condition and judicious applications of these result favorably as illustrated by figure 8.

How to Apply. There are several methods of applying these fertilizers. Raw rock phosphate is applied by means of a lime and phosphate distributor, fertilizer drill, or with the manure spreader when the manure is applied to the soil. Bone meal may be broad-casted and incorporated with the soil when the seed bed is prepared, distributed by means of a fertilizer distributor or attachment to the grain drill.



A FOUR YEAR CASH CROP ROTATION.

Figure 6.—Owing to the residuary effects of phosphates the rotation should be fertilized. A four year rotation for the finer textured soils showing the places to apply phosphates to best advantage.



A THREE YEAR ROTATION FOR SANDY SOIL

Figure 7.—Rotation for sandy soil showing where to apply phosphate fertilizers.

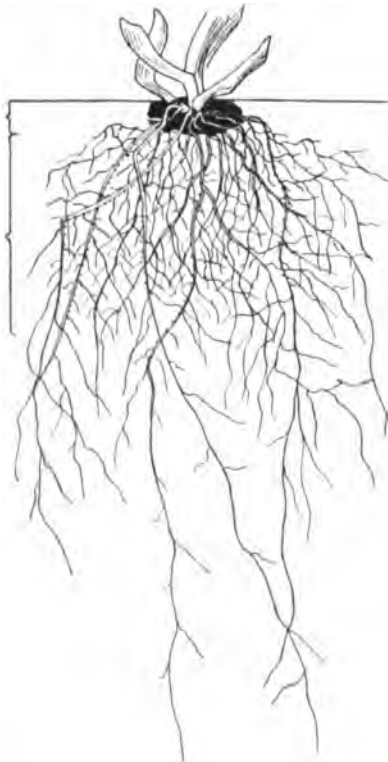


Figure 8.—The use of phosphates and marl is proving very beneficial to clover on many Michigan soils.



Figure 9.—Lime, rock phosphate or other fertilizers may be applied by means of a combination sower.

About 80 per cent of the entire root development of crops is produced in the furrow slice of soil



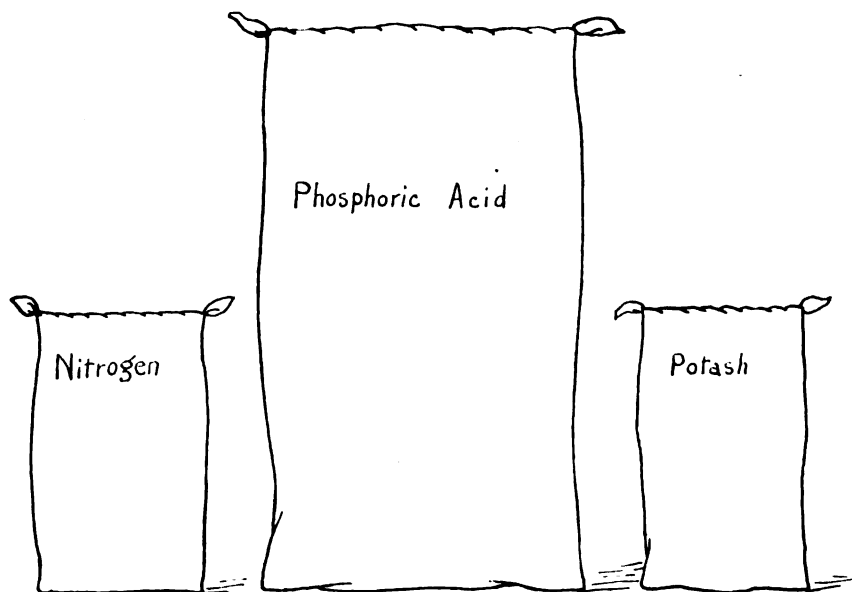
Do not leave phosphates on the surface of the soil. Place them where the plants feed.

Figure 10.—Except when used in top dressing permanent meadows and pastures phosphatic fertilizers should be incorporated with the soil.

Acid phosphate is sometimes applied in the hill for corn or potatoes that is where small applications are made. This is not generally advisable inasmuch as the crops that follow do not receive much benefit from the residues. Some broadcast it by hand after the land is plowed and work it into the soil when the seed bed is being prepared. The majority of farmers, however, apply it by means of the fertilizer drill or attachment on the grain drill. In some cases it is sprinkled over manure in the spreader and applied along with it.

The fact should not be overlooked that the efficiency of these fertilizers is dependent upon their thorough incorporation with the surface layer of soil.

The reinforcement of farm manure with phosphorus is sound practice. Farm manure in comparison with commercial fertilizers is unbalanced. It may be cited for example that a 2-8-2 fertilizer mixture or one containing two per cent of ammonia, eight per cent phosphoric acid and two per cent potash is widely used. Ordinarily mixed farm yard manure contains about .5 per cent nitrogen, .25 per cent phosphoric acid and .6 per cent potash, thus being deficient in phosphoric acid. By supplementing the manure with phosphorus smaller applications of manure may be made with better results.



Relative amounts of nitrogen, phosphoric acid, and potash
in a 2-8-2 commercial fertilizer.

Figure 11.

The Phosphorus Balance of Michigan Soils. The amount of phosphorus lost annually from Michigan's soils is of great concern to the commonwealth. The figures in table I show as nearly as can be estimated the quantity of this element of plant-food removed by the staple crops and pastures, but not including fruit, mint, chicory, or vegetables such

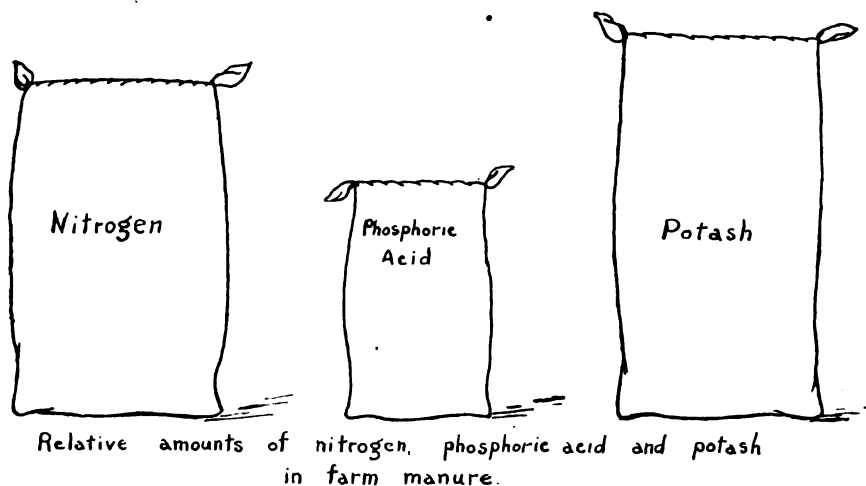


Figure 12.

as the onion, cucumber, cabbage and others, and in addition the amount of phosphorus returned to the soil in farm manures and commercial fertilizers. The fertilizers are considered to carry 10 per cent phosphoric acid.

TABLE I.—PHOSPHORUS BALANCE OF MICHIGAN SOILS.

	Pounds annually.
Phosphorus removed from the soil.....	77,999,678
Phosphorus returned in farm manures.....	46,304,763
Phosphorus returned in commercial fertilizers.....	8,732,000
Total phosphorus returned to soil.....	55,036,763
Phosphorus lost from the soil.....	22,962,915

These figures reveal rather striking conditions. There are being lost annually about 22,900,000 pounds of phosphorus from our soils. It is true that as yet we are not ready to ignore the phosphorus content of many of the soils, that is supply it in sufficient quantities to meet the requirement of the crops grown. Yet we are approaching this situation and in case of many fields it seems to have been reached, and to these

phosphorus should be added in excess of the amount removed by the crops produced. There are soils now practically sterile which within the memory of the older inhabitants produced abundant yields of crops. Assuredly this condition is not due wholly to the depletion of available phosphorus, but that it is an important factor is evidenced by the beneficial results received by many farmers who have made use of phosphatic fertilizers.

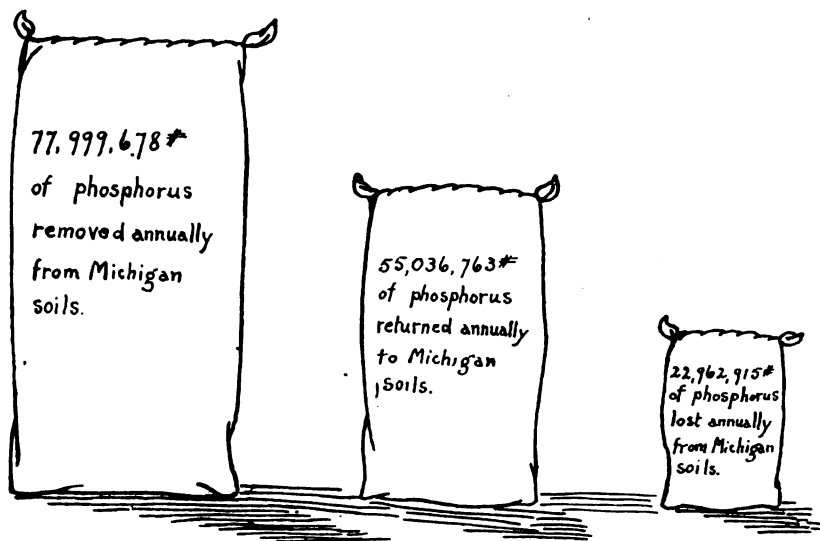


Figure 13.—If Michigan soils are to continue to be productive or are to be increased in productivity the use of phosphorus must become general.

The phosphorus situation on a given farm is governed largely by the system of farming followed, the amount of feed purchased and the care of the manure produced. In the light of our present day knowledge the conditions with respect to this element of plant-food on a dairy farm is about as given in table 2.

TABLE 2.—THE PHOSPHORUS BALANCE ON A DAIRY FARM WHICH CARRIES 20 COWS 10 CATTLE, 20 HOGS AND 5 HORSES.

Crops produced	Phos- phorus content pounds.	Consumed by stock		Sold from farm		Returned to soil	
		Produce	Phos- phorus content pounds.	Produce	Phos- phorus content pounds.	Produce	Phos- phorus content pounds.
Hay 10 acres, 20 T.....	88.0	20 T.	88.0				
Corn 10 acres:							
Grain, 400 bu.....	64.0	250 bu.	40.0	180 bu.	24.0		
Stover, 12 T.....	32.0	7.5 T.	20.0			4.5	12.0
Corn 10 acres:							
Silage, 100 T.....	100.0	100 T.	100.0				
Oats 20 acres:							
Grain, 1,200 bu.....	139.2	800 bu.	92.8	400 bu.	46.4		
Straw, 30 T.....	52.8	Fed 6.5 T. Bedding 17.5	11.4	6 T.	10.56		
Barley 10 acres:							
Grain, 340 bu.....	54.4	340 bu.	54.4				
Straw, 11 T.....	19.0			11 T.	19.03		
Beans 10 acres:							
Grain, 200 bu.....	64.0			200 bu.	64.0		
Straw, 8 T.....	20.8					8 T.	20.8
Pasture, 30 acres.....	210.0		210.0				
Purchased:							
Bran 7.5 T.....		7.5 T.	192.0				
Total phosphorus.....	844.2		809.1		163.99		63.64

Loss in process of digestion and handling of ma-
nure, 40 per cent..... 326.6

482.5

phosphorus returned to soil in 482.5
manure.

Total phosphorus returned to soil 546.14

Total phosphorus lost from farm, 298.06 lbs.

Pounds of 16 per cent acid phosphate needed to make good the loss, 4,270.

It is to be noted if one purchases 7.5 tons of bran, feeds it and considers that 40 per cent of the phosphorus does not return to the soil due to its retention by the animals and losses from the manure, there is a deficit of 298.06 pounds of phosphorus on a 100-acre dairy farm, the conditions being as outlined. There are required 4270 pounds of 16% acid phosphate to replace the annual loss.

The situation is different on a farm where less stock is fed, less feed purchased and much of the crops produced is sold. Under the conditions outlined there are required annually 6830 pounds of 16 per cent acid phosphate to meet the losses entailed on a 90-acre farm.

The writers are indebted to Professors Brown and Edwards of the Animal Husbandry Department and Professor Ridell of the Dairy Department for data regarding the weight, feeding and care of animals, used in compiling tables 2 and 3.

TABLE 3.—THE PHOSPHORUS BALANCE ON A 90 ACRE "MIXED" FARM WHICH CARRIES 6 COWS, 4 CATTLE, 14 HOGS AND 5 HORSES.

Crops produced	Phosphorus content pounds.	Consumed by stock		Sold from farm		Returned to soil	
		Produce	Phosphorus content pounds.	Produce	Phosphorus content pounds.	Produce	Phosphorus content pounds
Hay 10 acres, 20 T.	88.0	17 T.	74.8	3 T.	13.2		
Corn 15 acres:							
Grain, 600 bu.	96.0	287 bu.	46.0	313 bu.	50.0		
Stover, 18.1 T.	48.0	11.3 T.	30.0			6.8 T.	18.0 T.
Oats 20 acres:							
Grain, 1,200 bu.	139.2	800 bu.	92.8	400 bu.	46.4		
Straw, 30 T.	52.8 T.	Fed 8 T. Bedding 8 T.	14.1				
				14.1 T.	24.6	8. T.	14.1
Barley 10 acres:							
Grain, 340 bu.	54.4			340 bu.	54.4		
Straw, 11 T.	19.0			11 T.	19.0		
Beans 15 acres:							
Grain, 300 bu.	96.0			300 bu.	96.0		
Straw, 1.2 T.	31.2					1.2	31.2
Potatoes 5 acres:							
1,000 bu.	39.9			1000 bu.	35.9		
Pasture 15 acres	78.7		78.7				
Total phosphorus	743.2		336.4		343.5		63.3

Loss in process of digestion and handling of manure, 40 per cent.

134.6

201.8

phosphorus returned to soil in manure. 201.8

Total phosphorus returned to soil 265.1

Total phosphorus lost from farm, 478.1.

Pounds of 16 per cent acid phosphate needed to make good the loss, 6,830.

That the system of farming followed, the amount of feed purchased and the care of the manure produced govern the phosphorus balance on a farm is further supported by chemical examinations of representative soils which have been cropped for about seventy years without the return of much fertilizing materials, and the corresponding virgin or uncropped soils. Such tests of course show wide variation in the changes in composition of soils from different farms. In some instances they are negligible; in case of others as much as sixty per cent of the phosphorus of the surface soil has been removed, while forty per cent losses are common. Later on the effect of different systems of farming or the changes in the composition will be reported.

Phosphorus in Some Michigan Soils. The phosphorus content of Michigan's soils varies. The members of the Soils Section have been engaged in a systematic study of the representative soils of the State. In addition to other investigations, the composition of the samples collected has been determined. The results, thus far obtained, that bear upon the phosphorus situation are set forth in table 4. The phosphorus content of the representative soils of Berrien, Cass, St. Joseph, Branch, Van Buren,

Allegan, Newaygo, Mason, Manistee, Ingham counties and the Old Lake Bed of Eastern Michigan is given.

Representing as they do much of the lower peninsula these figures are of great interest and importance to the future welfare of the commonwealth. They show that our soils are not high in phosphorus. A soil that contains a total of about 2000 pounds of phosphorus per acre to a depth of seven inches is considered to be well supplied with this element of plant-food. The pine and scrub oak lands usually are extremely low in this substance, the prairie soils are highest and others occupy an intermediate position with respect to their phosphorus content.



Figure 11.—Bundles of wheat from equal areas of fertilized and unfertilized silt loam soils. The bundles on the right in each group were grown on land receiving 200 lbs. per acre of 18 per cent acid phosphate.

Table 4. Phosphorus in the surface layer of typical Michigan soils.

BERRIEN COUNTY SOILS.

Description.	Pounds per acre
Undulating to level sand known as Covert sand—scrub oak lands. Areas occur in the S. W. corner of county. Principally in New Buffalo, Chickaming and Lake townships.....	884
Heavy silt loam with heavy subsoil called clay soil. Hickory, beech and maple land. Occurs principally in Hagar township	890

Description.	Pounds per acre
Rolling sand to heavy sandy loam with sandy clay subsoil. Oak and hickory land. Large areas occur S. W. of the center of the county. Weesaw, Berrien, Niles and Three Oaks, Buchanan, Lake, Bertrand, Oronoko townships	796
Level sand along St. Joseph and Paw Paw river and Dowagiac creek. Oak land	1248
Undulating to rolling sand largely timbered with maple, elm, oak, hickory, large area around Arden.....	775
Rolling sand original timber beech, oak, hickory and maple, fruit land. Occurs principally in Watervliet, Bainbridge and Pipestone townships	1206



Figure 15.—Some soils respond to nitrogen, phosphorus and potassium in the initial stages of their improvement. Rye growing on Cass County farm, on the right no treatment, on the left, nitrate of soda, acid phosphate and potash.

CASS COUNTY SOILS.

Undulating to rolling sand with a sandy subsoil. Oak and beech land found in Milton, Howard, LaGrange, Wayne, Silver Creek townships	1018
Undulating to rolling sandy loam, original timber beech, maple, hickory, basswood. Occurs principally in LaGrange, Silver Creek and Porter townships.....	1117
Undulating loam, original timber beech, maple, hickory and basswood. Areas found in Pokagon, Penn, Calvin, Mason, Porter, Newberg, Marcellus and Volinia townships.....	1227
Prairie, Volinia, Penn and Milton townships.....	1903

ST. JOSEPH COUNTY SOILS.

Prairie soils, areas near Colon, Flowerfield Station, Mendon, Sturgis, White Pigeon and Three Rivers	1093
Level sand typical of large areas throughout the county—oak, maple	787

Description.	Pounds per acre
Undulating sand with yellow sand subsoil. Areas in Colon, Constantine, Park and Mendon townships. Oak, beech, maple	914
Undulating to rolling sandy loam to silt loam. Beech and maple land, large areas in Leonidas and Mendon townships.....	1312
Undulating sandy loam with sandy subsoil—beech, maple and oak land. Areas found in Flowerfield, Sturgis, Fawn River and Park townships	954

BRANCH COUNTY SOILS.

Undulating to rolling sandy loam to silt loam, Hickory, maple, oak and beech. Large areas in all townships except Bethel and Noble	1115
Level sand areas throughout county, oak	992
Level sand to sandy loam. Oak, maple. Areas in Ovid, Butler, Giriad, Sherwood, Union, Batavia and Matteson.....	1139
Undulating to rolling sand to sandy loam. Oak, hickory, beech, occurs principally in the eastern part of Bethel township.....	1001
Undulating sand (glacial outwash) southwest corner of Noble township, poplar, red oak, elm, ash.....	1017



Figure 16.—The response of crops to applications of phosphorus to some soils is remarkable. Oats growing on Van Buren County soil; on the right the soil received 2000 pounds of raw rock phosphate per acre the previous year, on the left no phosphate was applied.

VAN BUREN COUNTY SOILS.

Poor rolling sand, original timber oak and beech, occurs principally in Decatur, Porter, Almena, Antwerp and Paw Paw townships	971
Level to undulating sand, oak openings, large areas throughout county	985

Description.	Pounds per acre
Rolling sandy loam called Arlington Hills, timber oak, hickory, and beech, areas occur in Lawrence, Bangor, Waverly, Arlington, Columbia and Bloomingdale townships.....	884
Rolling sand, oak and beech timber found in the S. W. corner of county in Hartford, Keeler, Bangor and Covert townships....	992
Level poor sand of Covert township. Scrub oak land.....	659
Rolling sandy loam occurs principally in Geneva township. Original timber hickory, maple, beech and basswood.....	568
Level sand, along Paw Paw River, Oak land.....	1017

ALLEGAN COUNTY SOILS.

Upland loam soils originally timbered with beech, maple, oak and and walnut. Large areas in the west central part of the county. Small area throughout the county	627
Clay loam soils originally growing hickory, elm and oak. Areas generally distributed in the county	974
Low lying dark colored sandy soil, original timber oak and walnut. Areas throughout the county.....	661
Rolling sandy loam originally growing oak, maple, beech and hickory. Large areas in the eastern half of the county. Smaller areas generally distributed	794
Black clay soil which was covered with elm, oak and maple. Large areas lying between Allegan and northwest corner of the county. Small areas distributed throughout the county..	1035

MASON COUNTY SOILS.

Ash, elm, soft maple	1043
Pine soils	559

MANISTEE COUNTY SOILS.

Level to undulating sand; original timber pine, second growth scrub oak. Lower areas, poplar. Areas found throughout the county	612
Level to undulating sand; originally grew large pines. Second growth principally oak. Areas of this soil are distributed throughout the county	722
Undulating to rolling sand. Mixed timber land. Large areas found in the northwest part of the county.....	806
Level sand along the Manistee river originally grew pine, second growth oak	613

INGHAM COUNTY SOILS.

Undulating silt loam to clay loams, original timber beech and maple. Areas occur in Leroy, Delhi, Alaieton and Wheatfield townships	1182
Undulating sandy loams to loams, original timber beech, maple, oak and basswood, occurs principally in Williamston, Vevay, Wheatfield, Delhi and Alaieton townships.....	855

Description.	Pounds per acre
Rolling sand, original timber scrub oak and poplar, with some maple and elm. Areas occur in Ingham, Bunker Hill, Meridian and Onondaga townships.....	912
Rolling sandy loam to silt loam. Original timber beech, maple, elm, oak and hickory. Areas occur in Onondaga, Stockbridge, Aurelius, Leslie, Williamston and Ingham townships.....	952
Level sandy soils growing oak and poplar. Found principally in Locke, Williamston, Leslie, Bunker Hill and Stockbridge twps.	1303
Rolling silt loam with heavy subsoil. Hardwood land—areas found in Brown, Bear Lake and Manistee townships.....	718
Level to undulating sand. Original timber pine, second growth scrub oak, soil quite shallow. Large areas found in the southeastern part of the county.....	584
Level to undulating sand originally growing maple. Soils is deeper than the pine lands. Areas found in Maple Grove, Bear Lake and Brown township.....	694



Figure 17.—Some soils are very deficient in phosphorus and where applied its effects on plants are very striking even in the early stages of their development. In the center of photograph is shown wheat growing on untreated sandy loam soil. The remainder of the field received 200 lbs. per acre of acid phosphate. (Courtesy of H. B. Blandford)

NEWAYGO COUNTY SOILS.

Level brownish yellow sand. Original timber pine, second-growth scrub oak. Large areas in Garfield, Brooks, Croton, Big Prairie and Everett townships	800
Level sand, subsoil gray "water sand." Original timber pine, second-growth oak and poplar. Areas found in the southwestern part of the county	519
Rolling sand with sandy subsoil. Original timber hardwood. Areas around Fremont and Grant.....	778
Rolling brown sandy loam to silt loam with heavy subsoil. Hardwood land. Areas near Aetna, Ashland Centre and Grant	1105

Description.	Pounds per acre
Gently rolling grayish brown sand. Original timber pine, second-growth oak. Areas in Troy township.....	538
Flat gray sand plains found in the northwestern part of the county. Original timber pine, second-growth poplar and scrub oak	506
Gray sand with yellow to reddish brown sand subsoil. So-called "flats" of the north central part of the county. Original timber pine. Very little second growth.....	552
Level brown to gray sand. Soil quite deep. Large pine land areas in Barton and Norwich townships.....	748
Gray sand with reddish yellow sand subsoil. Large pine land. Large areas in Goodwell and Wilcox townships.....	765
Rolling brown sand with clayey sand subsoil, original timber large pine and hardwood. Large areas in Ensley township.	1317
Rolling brown to gray sandy loam with heavy subsoil. Hardwood land areas in eastern Big Prairie and Goodwell twps..	758

SOILS OF THE LAKE BED AREA IN EASTERN MICHIGAN.

Undulating to slightly rolling brown silt loam on yellowish brown clay, pre-dominating type of soil in Macomb, St. Clair and Huron counties, and large areas occurring in Sanilac and Oakland counties.....	1304
Level to undulating or rolling brown sand underlaid by yellow sand and then clay. Areas occur along Lake Huron and the St. Clair and Black rivers. Several areas occur in Huron county	530
Undulating to gently rolling brown sandy loam containing some gravel, principally in St. Clair, Macomb and Oakland counties	1092
Sandy ridges of southeast corner of the Lake Bed Area.....	1050
Level to undulating sand underlaid at varying depths by clay. Southeast corner of the Lake Bed.....	1786
Undulating to gently rolling sandy loam with loamy subsoil, occurring where larger streams enter the Lake Bed Area.....	751
Black sandy loam underlaid by grayish sandy clay which grades into a heavier soil. Areas in Saginaw, Bay and Genesee county	1115
Black silt loam on yellowish brown clay subsoil, level to undulating. Areas occur from the thumb south to the State line	1610
Low lying silt loam with water table about 24 inches below the surface. Used for hay and pasture in the southeastern part of the Lake Bed Area	917
Dark colored sandy loam with a heavy subsoil, large areas of which occur in Saginaw and Bay Counties, and smaller areas in neighboring counties	1150
Dark colored silt loam on a heavy subsoil occurring in Iosco, Arenac, and other counties in the northern part of the Lake Bed Area	1216
Dark colored sandy loam with gravelly subsoil forming the Utica plains of Macomb county	751

Description	Pounds Per acre
Dark colored loam soil with clay subsoil occurring in Gratiot and neighboring counties	1264
Dark colored silt loam underlaid with open sandy silt. Found in Sanilac and neighboring counties.....	785
Sandy soil underlaid with sand for about 3 feet and then clay, occurring in Midland and other counties in the northern part of the Lake Bed Area	765



Figure 18.—Tomatoes, on the left no fertilizer, on the right acid phosphate. Sandy soil in Wayne County.

Results obtained From the Use of Phosphorus. A safe margin of profit may be derived from the judicious use of phosphorus on many of Michigan's sands, loams, clays and mucks. In determining the profits derived from the use of phosphatic or other fertilizers the increase in yield due to their application, the cost of the treatment and the value of the product grown must be considered. Let us suppose for example a 200-pound per acre application of 16% acid phosphate, costing \$3.20 on the land, increases the yield of wheat 9 bushels, or oats 25 bushels, and the clover following these crops 1200 pounds per acre. The wheat sold for two dollars per bushel at the farm, the oats at seventy cents and the clover hay was worth \$15 a ton under one set of conditions. At another time the phosphate cost \$2.00 on the land, the wheat brought \$1.00 per bushel, the oats forty cents and the clover was worth \$7.00 a ton at the farm. Now what are the net profits derived from the investment in the fertilizer? This question is answered in table 5.

TABLE 5.—COMPARATIVE RETURNS FROM THE USE OF ACID PHOSPHATE UNDER CONDITIONS OF HIGH AND LOW PRICES FOR PRODUCE AND FERTILIZER.

Crop	Increased yield due to fertilizer		Value of increase		Total value of increase	Cost of fertilizer	Cost of lime	Net profit from use of lime and fertilizer.
	Grain	Straw	Grain per bu.	Straw and hay per ton				
Wheat	9 bu.	900 lbs.	\$2.00	\$3.00				
Clover		1,200 lbs.		15.00	\$28.35	\$3.20	\$3.50	\$21.65
Oats	25 bu.	1,250 lbs.	.70	3.50				
Clover		1,200 lbs.		15.00	28.69	3.20	3.50	21.99
Wheat	9 bu.	900 lbs.	1.00	1.50				
Clover		1,200		7.00	13.88	2.00	3.00	7.88
Oats	25 bu.	1,250 lbs.	.40	2.00				
Clover		1,200		7.00	15.45	2.00	3.00	9.45

These figures show that when there is a substantial increase in yield from the use of phosphorus a greater profit may be derived under the first set of conditions, namely, high prices for fertilizer and crops grown, than under the latter, or lower prices.



Figure 19. Some soils are exceedingly responsive to fertilizers. The two rows of corn shown in the center of the photograph and several in the right were unfertilized. The others received 125 pounds per acre of a complete fertilizer. (Courtesy of C. M. Kidman).

Furthermore, there is a tendency to overlook the importance of increasing crop yields by means of lime, phosphates, manures and other materials to the farm management scheme. Suppose for example a live-stock farmer is able by the judicious use of lime and phosphate to grow satisfactory yields of alfalfa or clover and thereby decrease the consumption of high priced mill feeds, and in addition the grain production

is increased by the growth of legumes. This means that more livestock may be maintained more cheaply on the same acreage, or the same number on a smaller area with less labor.

TABLE 6.—HOURS OF HUMAN LABOR AND HORSE LABOR AND ACRES OF LAND REQUIRED TO PRODUCE THE SAME AMOUNT OF CROPS ON AVERAGE LAND AND LAND PROPERLY DRAINED, LIMED AND FERTILIZED.

Crop	Amount produced	Average land			Drained, limed and fertilized land.		
		Acres required	Man hours	Horse hours	Acres required	Man hours	Horse hours
Beans.....	195 bu.	24	840	984	10	350	410
Oats.....	600 bu.	20	252	454	9	113.4	204.3
Wheat.....	340 bu.	22	369.6	778.8	10	168	354
Hay.....	25 tons	20	98	362	11	53.9	199.1
Total.....		86	1,559.6	2,578.8	40	685.3	1,167.4

This does not include the time required to haul, thresh or stack the produce.

A number of field tests have been made to determine the response of different classes of soil to treatments with acid phosphate. Some of these have been conducted cooperatively on county farms, some with farmers and others with county agricultural agents.* In several instances the results obtained have been remarkable indeed.

Field tests have been in progress three years at the Van Buren County farm on sandy loam soil. The first year corn was planted on the experimental plots, but owing to an accident the yields were not taken. Observations made by Grantham during the growing season and a few days previous to the time of harvest of the corn revealed that the presence of either raw rock phosphate or acid phosphate increased the rate of growth even in the early stages of its development. It was estimated that the yield was increased seven bushels by the phosphorus.

The second year oats were seeded and the yield was increased by the phosphorus that the corn crop did not utilize, as shown by figures 5 and 16.

Interesting results have been obtained from field tests at the Cass county farm on sandy soil. These have been in progress two years, and each treatment is duplicated or in other words two different portions of the field receive the same treatment. The yield of rye on three plots is given in table 7. The acid phosphate and the potassium chloride were applied to soy beans the previous year, but the sodium nitrate was applied to the rye crop 50 pounds at the time of seeding and 50 pounds in early spring.

The writers are indebted to Mr. C. H. Graves, Farm Mgt. Demonstrator, for much of the data in the above table.

Table 7. Result of field tests with rye on Cass Co. Soil 1918.

Treatment.	Yield of grain. Bus. per acre.
16 per cent acid phosphate 200 pounds per acre.....	
Sodium nitrate 50 pounds in fall and 50 pounds in spring.....	23.06
Muriate of potash 200 pounds per acre	
No treatment	15.60
Increase due to fertilizer	13.06
16 per cent acid phosphate 200 pounds per acre.....	
Sodium nitrate 50 pounds in fall and 50 pounds in spring.....	21.01
Increase in yield over untreated	5.41

This soil is deficient in vegetable matter, and responds to applications of complete fertilizers and its judicious use under normal conditions at least until clover is established in the rotation is profitable. Sweet clover responds vigorously to lime and phosphorus on this soil as illustrated by figure 21. When this crop is established in the rotation of course the nitrogen situation is largely solved.

Duplicate field tests were conducted on a sandy soil in Kent county in cooperation with H. G. Smith. Where 300 pounds of 16% acid phosphate were applied to the soil the yield of potatoes was materially increased.

Table 8. Results of field tests on Kent County Soils—1916.

Treatment.	Yields per acre bushel.
No treatment	100
300 pounds of 16 per cent acid phosphate.....	132

In cooperative experiments with S. A. Foster, of Ingham county, applications of lime as marl and either acid phosphate or raw rock phosphate have resulted profitably. (See figure 8.) The soil in question is a light sandy one, badly in need of lime as evidenced by the numerous failures to obtain suitable stands and yields of clover. Although this soil is not suitable for the production of oats, this crop was seeded the first season as a nurse crop for clover. The presence of the lime and phosphates increased the yield of oats and resulted in an excellent catch of clover. The following season the clover on the treated portion of the field outyielded that on the untreated land and was of much better quality. Moreover, about one bushel of seed was obtained per acre.

The cooperative investigations with several farmers have been gratifying indeed. The affects of acid phosphate when applied to several soils are illustrated by means of photographs.

Summary and Conclusions. The mineral element of plant-food, phosphorus is popularly referred to as phosphoric acid and phosphate.

The three chief carriers of phosphorus are raw rock phosphate, bone meal and acid phosphate.

The application of phosphorus in suitable amounts to soils deficient in it results favorably, increasing the root, leaf and stem development, aids in grain formation and shortens the growing period.

*At this time we desire to express our gratitude and acknowledge our indebtedness to these men for their commendable attitude toward the different lines of work undertaken, in fact the splendid spirit with which they have cooperated has made it possible for us to conduct the field tests.

The effects on the soil are beneficial rather than harmful and its judicious use is a businesslike procedure.

The most profitable amount to apply is governed by the nature of the soil, carrier used, as well as somewhat by the prices paid for the fertilizer and received for the crop grown.

The active form usually should be applied to the cash crops in the rotation and the other if used when sod, meadow or other crop residues are to be turned under.



Figure 21.—Sweet clover responds vigorously to lime and phosphorus. On some of the light soil's potash is needed. This clover is growing on the same soil as the rye shown in Figure 15. The result of lime and acid phosphate. It will solve the nitrogen and humus problem.

Phosphate fertilizers may be applied in several ways, but it is usually advisable to utilize a fertilizer distributor.

The phosphorus content of barnyard manure is relatively low in comparison with nitrogen and potassium and the reinforcement of it with one of the carriers usually is desirable.

As nearly as can be estimated about 22,900,000 pounds of phosphorus are lost from Michigan soils annually.

Analyses of samples of soil from fields long under cultivation and from uncropped adjacent land show that the change in the phosphorus content of the soil is governed by the system of farming followed. In several instances as much as forty per cent of phosphorus was found to have been removed from the surface soil, in others twenty per cent, and in still others little if any changes have taken place.

The phosphorus content of representative soils occurring in twenty

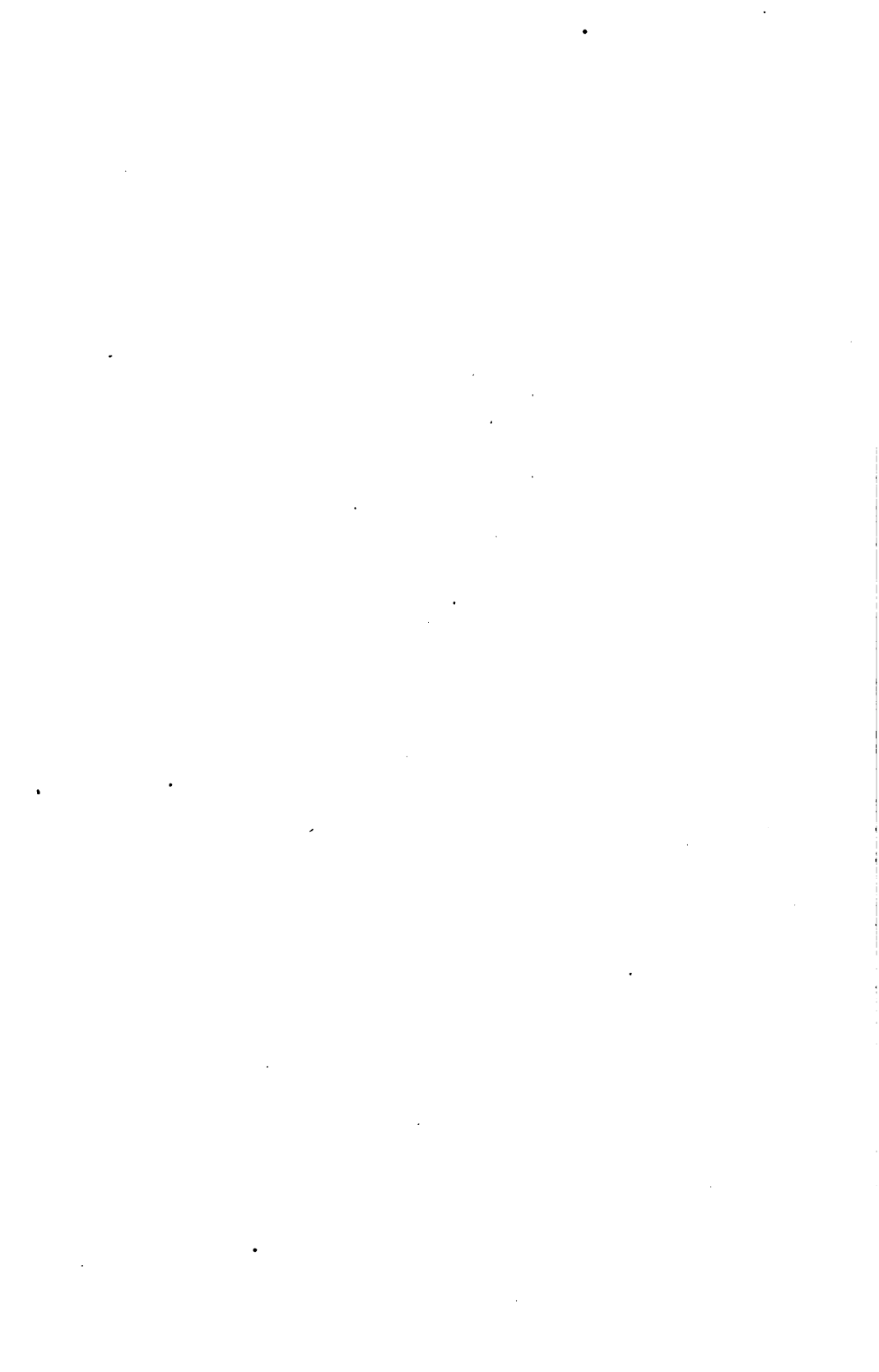
counties has been determined. The results show that pine and scrub oak lands usually contain less than 750 pounds. Prairie soils are the highest in this element, while others occupy an intermediate position.

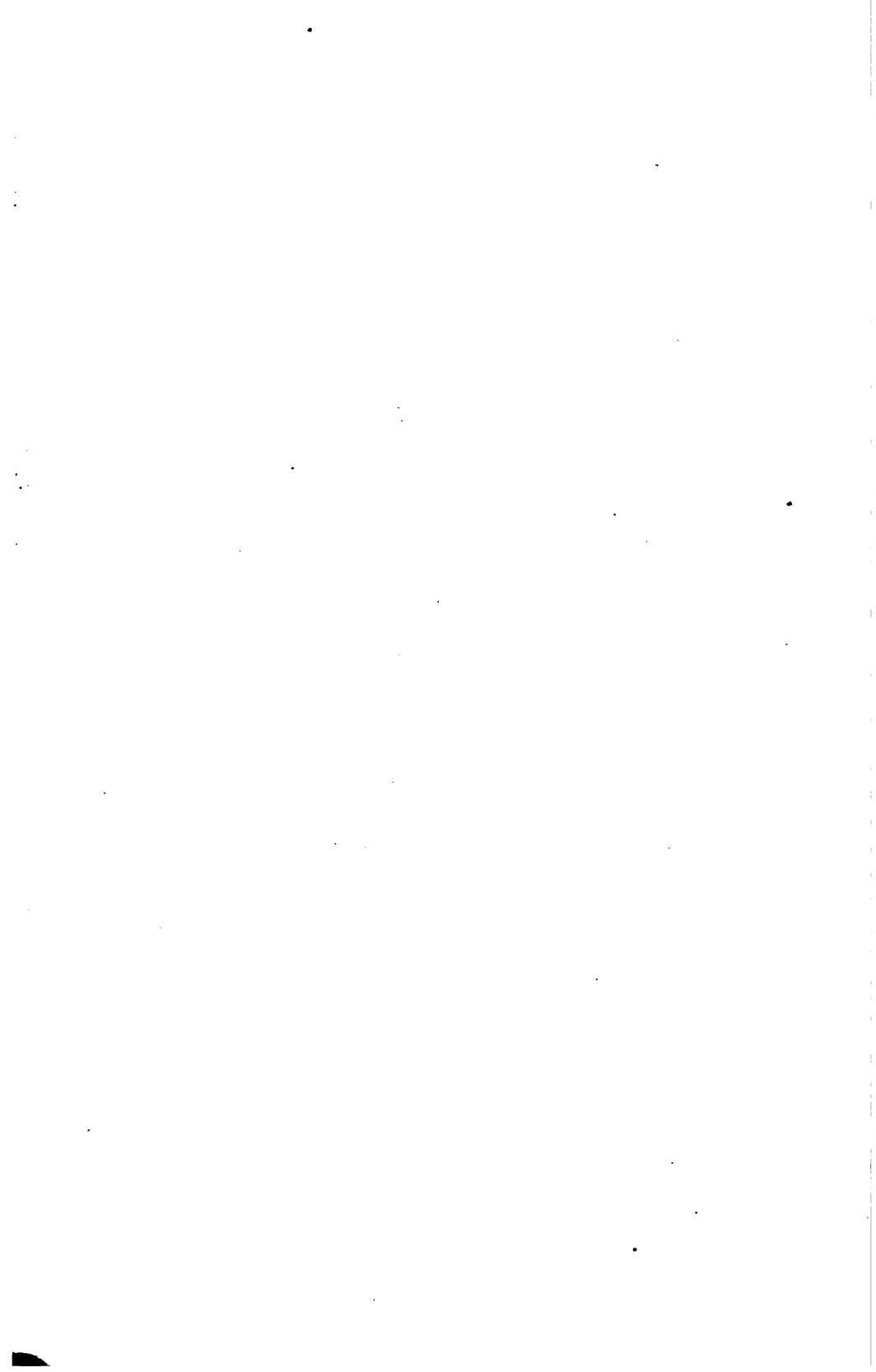
Not only should the cost of the fertilizer be considered in estimating the profit obtained from its use, but also the market price of the crops grown.

The increase in yield of crops by the use of phosphorus reduces both the man and horse labor hours, required to produce a given amount of material.

Many of Michigan's sand, loam, clay and muck soils respond profitably to applications of phosphorus. The readily available, or acid phosphate, is the most extensively employed.

By means of cooperative experiments with county agricultural agents many farmers, and managers of county farms we have been able to obtain information with respect to the phosphorus needs of several of Michigan's soils. In view of the favorable results obtained we are forced to conclude that every farmer who has not ascertained to his satisfaction, by means of thorough field trials whether the judicious use of phosphorus on his soil is a profitable investment should do so.





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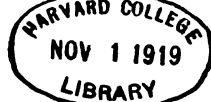
EXPERIMENT STATION

CHEMICAL SECTION

COMMERCIAL FEEDING STUFFS

BY
ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER, A. L. LEWIS
AND M. L. GRETTEMBERGER

EAST LANSING, MICHIGAN
1919



The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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*Absent on leave for war service.

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
Grayling, Crawford County, 80 acres deeded.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.

COMMERCIAL FEEDING STUFFS

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AND M. L. GRETENBERGER.

The present feeding stuffs law (Act 91, P. A. 1917) became operative April 1, 1918. As the full text of the act was printed in Bulletin No. 279 only the main provisions will be discussed. Copies of the law will be furnished upon request.

Label. Every lot or parcel of "commercial feeding stuffs" shall bear on the bags or tags attached thereto a statement certifying, 1st, the net weight of the contents of the package, lot, or parcel; 2nd, the name, brand or trademark; 3rd, the name and principal address of the manufacturer or person responsible for placing the commodity on the market; 4th, the minimum percentage of crude protein, the minimum percentage of crude fat and the maximum percentage of crude fibre; 5th, the specific name of each ingredient used in its manufacture.

Registration. All "commercial feeding stuffs" within the meaning of the act must be registered annually, on or before January 1st or before the feed is placed on sale and the license fee is \$20.00 per brand.

Samples not required. The forwarding of samples at the time of applying for license is not necessary except when requested by the administrative officer.

Registrations may be refused or cancelled. The administrative officer may refuse to license a brand if the name appears to be deceptive or misleading. He also has power to cancel a license if it appears, at any time, that any of the provisions of the law have been violated.

Materials exempt from license fee. Unmixed whole seeds and grains; unmixed meals made directly from the entire grains of corn, wheat, rye, barley, oats, buckwheat, flaxseed, kafir and milo; corn and oats feed made by grinding together the pure grains of corn and oats; wheat, rye and buckwheat brans or middlings when unmixed with other materials; whole hays, straws, ensilage and corn stover when unmixed with other materials and all materials containing 60 per cent or more of water.

The definitions adopted by the Association of Feed Control Officials will be considered official in Michigan, and it is expected that the manufacturers will adhere to them as closely as possible.

RULES.

The following rules were passed by the State Board of Agriculture at a meeting held March 20, 1918, in East Lansing, Michigan:

RULE No. 1. "*Wheat Bran with Screenings not exceeding Mill Run*" is interpreted as meaning bran to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the bran. The Screenings may or may not be reduced.

RULE No. 2. "*Wheat Middlings with Screenings not exceeding Mill Run*" is interpreted as meaning middlings to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the middlings. The screenings may or may not be reduced.

RULE No. 3. "*Wheat Bran and Wheat Middlings* when labelled as containing "Screenings not exceeding Mill Run" are considered to be "Commercial Feeding Stuffs" within the meaning of the law and subject to license. This rule shall take effect April 1st, 1918.

RULE No. 4. "*Statement of Guaranteed Analysis*. Section 2 of the Feeding Stuffs law is interpreted to mean that only the minimum guarantees for Protein and Fat and the maximum guarantee for Crude Fiber may be stated on the labels. The sliding guarantee is prohibited. This rule shall take effect April 1st, 1918."

THE FOLLOWING ADDITIONAL RULES WERE PASSED BY THE STATE BOARD OF AGRICULTURE ON MAY 21st, 1919

RULE No. 5. *Inert Materials*. It is permissible to use grit, oyster shells, charcoal, and similar materials in compounding poultry feeds, providing, that not more than five (5) per cent of such inert material is used. The words "grit", "charcoal" etc., must constitute a part of the brand name of all feeds containing these ingredients and must be printed in the same size and face of type as the balance of the name, as PRIME POULTRY FEED WITH GRIT AND CHARCOAL.

RULE No. 6. *Seeds, Field Seeds, Miscellaneous Seeds*. These terms will not be accepted in the list of ingredients to cover a mixture of weed seeds. When such seeds are used in excess of five (5) per cent, the common name of each variety of seed must be given on the registration form and also on the tag or label. When used in amount less than five (5) per cent they may be registered as screenings providing the source of the screenings is given, as "clover screenings", "wheat screenings", etc.

RULE No. 7. *Screenings*. Screenings if sold as such without grinding, need not be licensed. If ground, they become a mixed meal and must be registered and labeled.

RULE No. 8. *Oat Feed*. This term will not be accepted when used to indicate any material other than whole or ground oats. Mixtures of

oat shorts, oat middlings and oat hulls will not be accepted under the term and the name of each separate ingredient will be required.

RULE No. 9. *Changing Guarantees.* Guarantees either as regards composition or ingredients will be changed only upon application by the manufacturer accompanied with a statement of the reasons for making such change. The old license certificate must be surrendered before a new one will be issued.

RULE No. 10. *Unlicensed Feed.* When any unlicensed "commercial feeding stuffs" as defined in section 1 of the law is found being offered for sale, the agent or dealer offering the feed for sale is notified and advised to remove it from sale. Those failing to accept the advice and heed the notice will be reported for violation of the law.

RULE No. 11. *Samples not meeting Guarantee.* In the case of appreciably deficient or of adulterated samples the manufacturer is given ten days' advance notice in which to file objections. A portion of the official sample is furnished if requested. As soon as the deficiency or adulteration is detected, the agent or person offering the feed for sale is notified and advised to remove it from sale. Those failing to accept this advice will be reported for violation of the law.

RULE No. 12. *Discarding or Substituting Samples.* All requests for discarding or substituting samples will be refused unless an error on the part of an agent of the State Board of Agriculture can be shown.

RULE No. 13. *Prosecutions.* Original shippers of unlicensed, adulterated or misbranded feeds will be prosecuted in all cases where it is possible to do so either under the State law or through cooperation with the United States Department of Agriculture under the Federal Food and Drugs Act. *Local dealers*, however, are directly responsible under the law for the feed they offer for sale and will be held accountable for failure of such feed to meet the requirements of the law, especially for selling a feed when notified to withdraw it from sale.

RULE No. 14. *Statement of Ingredients.* The attention of those desiring to register feeds for sale in this State is especially directed to the requirement of the law regarding the declaration of ingredients. Each and every substance used in compounding feed must be given in the list of ingredients without regard to the purpose for which it may be used.

RULE No. 15. *Net Weight.* The law requires that the "net weight of the package lot or parcel" be stated on the label. A statement of the gross weight only, will be considered to be a case of misbranding and dealt with accordingly.

RULE No. 16. *Fees.* The license fee, required by law, is twenty dollars (\$20.00) per brand. This should be paid on or before January 1st of each year or before the feed is placed on sale. All requests for a reduction of the license fee when the registration is made after the first of the year will be refused.

RULE No. 17. *Rebates.* The Michigan feed law makes no provision for the payment of rebates to cover deficiencies and although this practice often shows the good intention of the manufacturer, the payment of such rebates will have no bearing on any subsequent action which may

be taken in cases of violation of the law. When rebates are paid, dealers will be expected to prorate them to the purchasers so that the consumers may receive their benefit.

POINTS OF INTEREST TO DEALERS.

Represent only Reliable Firms and before purchasing feed for resale in Michigan, find out if the particular feed has been properly licensed by the manufacturer, broker, or party responsible for its shipment into the State. The State law has no jurisdiction over parties residing outside of the State and the only way they can be reached is through the U. S. Department of Agriculture for a violation of the Federal Food and Drugs Act. Failure to license a feed in Michigan would not be a violation of the Federal law and if properly tagged, shipment into the State cannot be prevented. The Michigan law becomes operative only when such feed is offered for sale within the State. Ignorance of the provisions of the law is not sufficient grounds for defense. When the inspectors find an unlicensed feed being offered for sale the dealer is given written notice and requested to discontinue the sale until the person or concern responsible for shipping the product into the State has complied with the requirements of the law. *Dealers who continue to sell unlicensed feeds after due notice has been given will be held responsible and evidence of the violation of the feeding stuffs law will be submitted to the Prosecuting Attorney in the county wherein the violation occurs.*

The feeding stuffs law requires that when feed is offered for sale in bulk the dealer shall keep on hand cards upon which shall be printed the information indicated under paragraph two, page three, and upon request the purchaser shall be furnished with such a card. This requirement applies to all sales no matter how small and must be fulfilled by dealers and grocers who make a practice of selling feeds from open barrels or tubs. That no hardship may be worked on those handling but small quantities of feed, the administrative officer holds that the law is complied with if the dealer attaches to the container from which the feed is sold a placard giving the information above specified.

Frequently it occurs that carload shipments reach their destination untagged. In such cases the dealer should telephone or telegraph the manufacturer or jobber immediately for proper tags and insist upon getting them at once as the sale of untagged feeds is not permissible under any circumstances. Tags sent forward by mail or placed in a carload of feed but not attached to the bags should be put on as the car is unloaded. Some responsible person should give the matter of proper tagging careful attention rather than trust it to some irresponsible laborer.

Retain Freight Bills. The State inspectors of feeding stuffs are also federal inspectors and authorized to take samples of shipments made in violation of the Federal Food and Drugs Act. In order to establish evidence of interstate shipment it is necessary to secure copies of the freight bill, bill of lading and bill of sale covering a shipment. Dealers should, therefore, keep on file all the documents and papers relating in any way to all interstate shipments of feed stuffs.

POINTS OF INTEREST TO PURCHASERS.

Consult the annual bulletin and find out what companies are most consistently meeting their guarantees.

Do not buy a feed simply because it is cheap without comparing the guaranteed analysis with that of other feeds that may be available and also examine it carefully to determine, if possible, the ingredients of which it is composed. In these times of high prices, one should consider these points carefully.

Do not send samples for analysis without first writing for instructions on how to secure a representative sample. A sample from one bag or a small handful taken from the top of several bags is not representative and an analysis of such a sample would be of no value. The cost of making an analysis is considerable and we cannot take the time to analyze samples that are not representative of the lot from which they were taken. Our inspectors are continually collecting samples of feeding stuffs and in many cases we can furnish information concerning a particular brand of feed without making another analysis.

When purchasing feed in car lots, an inspector will be sent to draw samples if the office of the chemist in charge is notified upon arrival of the car.

Do not accept feed in untagged or unlabeled bags except such feeds as are exempt from license as heretofore mentioned. An untagged package gives the purchaser no guarantee as to analysis or ingredients and furthermore the product is sold in violation of the feeding stuffs law. Such cases should be brought to the attention of the office of the chemist.

When buying bulk feeds that are subject to license, demand of the seller a printed guarantee giving the chemical analysis and ingredients—the law provides that the purchaser may have this information.

COOPERATION WITH U. S. DEPARTMENT OF AGRICULTURE.

Through a plan of cooperation devised by the U. S. Department of Agriculture the State inspectors are empowered to collect samples from interstate shipment of feed stuffs found in Michigan under the Food & Drugs Act. In this cooperative work fifteen cases were referred to the laboratory of the central inspection district in Chicago; eleven of the samples were collected on account of deficiencies in protein, and four were taken at the suggestion of the Chief Inspector of the central inspection district.

DEFINITIONS.

The following definitions of Feeding Stuffs and by-products used for feeding purposes have been adopted by the Association of Feed Control Officials of the United States at their several meetings, and, in the interest of uniformity, it is urged that all manufacturers and millers adhere to them as closely as possible in labeling the feeds intended for sale in Michigan.

Meal is the clean, sound, ground product of the entire grain, cereal or seed which it purports to represent.

Chop is a ground or chopped feed composed of one or more different cereals or by-products thereof. If it bears a name descriptive of the kind

of cereals, it must be made exclusively of the entire grains of those cereals.

Screenings are the smaller imperfect grains, weed seeds and other foreign material having feeding value, separated in cleaning the grain.

Alfalfa Meal is the entire alfalfa hay ground, and does not contain an admixture of ground alfalfa straw or other foreign materials.

ANIMAL PRODUCTS.

Blood Meal is ground dried blood.

Cracklings are the residue after partially extracting the fats and oils from the animal tissue. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

Digester Tankage is the residue from animal tissue exclusive of hoof and horn, specially prepared for feeding purposes by tanking under live steam, drying under high heat, and suitable grinding. If it contains more than 10 per cent of phosphoric acid (P_2O_5), it must be designated Digester Meat and Bone Tankage.

Meat Scrap and Meat Meal are the ground residues from animal tissue exclusive of hoof and horn. If they contain more than 10 per cent of phosphoric acid (P_2O_5), they must be designated Meat and Bone Scrap, and Meat and Bone Meal. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

BREWERS' AND DISTILLERS' PRODUCTS.

Brewers' Dried Grains are the properly dried residue from cereals obtained in the manufacture of beer.

Distillers' Dried Grains are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

Malt Sprouts are the sprouts of the barley grain. If the sprouts are derived from any other malted cereal, the source must be designated.

BUCKWHEAT PRODUCTS.

Buckwheat Shorts or Buckwheat Middlings are that portion of the buckwheat grain immediately inside of the hull after separation from the flour.

CORN PRODUCTS.

Corn Bran is the outer coating of the corn kernel.

Corn Feed Meal is the by-product obtained in the manufacture of cracked corn, with or without aspiration products added to the siftings, and is also the by-product obtained in the manufacture of table meal from the whole grain by the non-degerminating process.

Corn Germ Meal is a product in the manufacture of starch, glucose and other corn products, and is the germ layer from which a part of the corn oil has been extracted.

Grits are the hard, flinty portions of Indian corn, without hulls and germ.

Corn Gluten Meal is that part of commercial shelled corn that remains after the separation of the larger part of the starch, the germ and the

bran, by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Corn Gluten Feed is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germ by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Hominy Feed, Hominy Meal or Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the white corn kernel obtained in the manufacture of hominy, hominy grits and corn meal by the degerminating process.

Yellow Hominy Feed, Yellow Hominy Meal or Yellow Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the yellow corn kernel obtained in the manufacture of yellow hominy grits and yellow corn meal by the degerminating process.

OIL CAKE.

Oil Cake is the residual cake obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product, the name of the seed from which it is obtained shall be prefixed to "oil cake."

Ground Oil Cake is the product obtained by grinding oil cake. When used alone, the term "ground oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "ground oil cake."

COTTONSEED PRODUCTS.

Cottonseed Meal is a product of the cottonseed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 36 per cent of protein.

Choice Cottonseed Meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint and must contain at least 41 per cent of protein.

Prime Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent of protein.

Good Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

Cottonseed Feed is a mixture of cottonseed meal and cottonseed hulls containing less than 36 per cent of protein.

Cold Pressed Cottonseed is the product resulting from subjecting the

whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire cottonseed less the oil extracted.

Ground Cold Pressed Cottonseed is the ground product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire ground cottonseed less the oil extracted.

LINSEED AND FLAX PRODUCTS.

Linseed Meal is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes, provided that the final product shall not contain over 6 per cent of weed seeds and other foreign materials and provided further that no portion of the stated 6 per cent of weed seeds and other foreign materials shall be deliberately added.

Oil Meal is the ground product obtained after the extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from seeds which have been screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Oil Meal" shall be understood to designate linseed meal as defined. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to the words "oil meal."

Old Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Old Process Oil Meal" shall be understood to designate linseed meal as defined, made by the old process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "old process oil meal."

New Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, heating and the use of solvents from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone "New Process Oil Meal" shall be understood to designate linseed meal as defined, made by the new process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "new process oil meal."

Flax Plant By-Product is that portion of the flax plant remaining after the separation of the seed, the bast fiber and a portion of the shives, and consists of flax shives, flax pods, broken and immature flax seeds and the cortical tissue of the stem.

Ground Flaxseed or Flaxseed Meal is the product obtained by grinding flaxseed which has been screened and cleaned of weed seeds and other foreign material by the most improved commercial processes, provided that the final product shall not contain over 4 per cent of weed seeds and other foreign materials, and provided further that no portion of the stated 4 per cent of weed seeds and other foreign materials shall be deliberately added.

Unscreened Flaxseed Oil Feed is the ground product obtained after ex-

traction of part of the oil from unscreened flaxseed by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents. When sold without grinding the unground product shall be designated as "unscreened flaxseed oil feed cake."

Ingredients of Unscreened Flaxseed Oil Feed—Ground cake from partially extracted flaxseed and foreign seeds (wheat, wild buckwheat, pigeon grass, wild mustard, etc.)

Screenings Oil Feed is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from the smaller imperfect grains, weed seeds and other foreign materials having feeding value separated in cleaning the grain. The name of the grain from which the screenings are separated shall be prefixed to "screenings oil feed."

OAT PRODUCTS.

Oat Groats are the kernels of the oat berry.

Oat Hulls are the outer chaffy coverings of the oat grain.

Oat Middlings are the floury portion of the oat groat obtained in the milling of rolled oats.

Oat Shorts are the covering of the oat grain lying immediately inside the hull, being a fuzzy material carrying with it considerable portions of the fine floury part of the groat obtained in the milling of rolled oats.

Clipped Oat By-Product is the resultant by-product obtained in the manufacture of clipped oats. It may contain light, chaffy material broken from the ends of the hulls, empty hulls, light, immature oats and dust. It must not contain an excessive amount of oat hulls.

PEANUT PRODUCTS.

Peanut Oil Cake is the residue after the extraction of part of the oil by pressure or solvents from peanut kernels.

Peanut Oil Meal is the ground residue after the extraction of part of the oil from peanut kernels.

Unhulled Peanut Oil Feed is the ground residue obtained after extraction of part of the oil from whole peanuts, and the ingredients shall be designated as "peanut meal and hulls."

RICE PRODUCTS.

Rice Bran is the cuticle beneath the hull.

Rice Hulls are the outer chaffy coverings of the rice grain.

Rice Polish is the finely powdered material obtained in polishing the kernel.

WHEAT PRODUCTS.

Wheat Bran is the coarse outer coatings of the wheat berry obtained in the usual commercial milling process from wheat that has been cleaned and scoured.

Shorts or Standard Middlings are the fine particles of the outer and inner bran separated from bran and white middlings.

Wheat White Middlings or *White Middlings* are that part of the offal of wheat intermediate between shorts or standard middlings and red dog.

Shipstuff or Wheat Mixed Feed is a mixture of the products other than the flour obtained from the milling of the wheat berry.

Red Dog is a low grade wheat flour containing the finer particles of bran.

Wheat Bran with Mill Run Screenings is pure wheat bran plus the screenings which were separated from the wheat used in preparing said bran.

Wheat Bran with Screenings not Exceeding Mill Run is either wheat bran with the whole mill run of screenings or wheat bran with a portion of the mill run of screenings, provided that such portion is not an inferior portion thereof.

MISCELLANEOUS PRODUCTS.

Yeast or Vinegar Dried Grains are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar and consists of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugars, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast.

Palm Kernel Oil Meal is the ground residue from the extraction of part of the oil by pressure or solvents from the kernel of the fruit of the *Elaeis guineensis* or *Elaeis malanococca*.

Ivory Nut Meal is ground ivory nuts.

TENTATIVE DEFINITIONS.

Barley Feed is the entire by-product resulting from the manufacture of pearl barley made from clean barley.

Barley Mixed Feed is the entire offal from the milling of barley flour from clean barley and is composed of barley hulls and barley middlings.

Dried Beet Pulp is the material obtained by drying the residue from sugar beets which have been extracted in the process of manufacturing sugar and shall not contain excessive amounts of crowns, tails or sand.

Cocoanut Oil Meal is the ground residue from the extraction of part of the oil from the meat of the cocoanut.

Wheat Bran consists of the coarse outer coatings of the kernel obtained in the usual commercial process of milling from wheat that has been cleaned and scoured.

Shorts or Standard Middlings consists mostly of the fine particles of bran and germ and contains very little of fibrous offal obtained from the "tail of the mill."

Gray (or total) *Shorts* consists of the fine particles of the outer bran, the inner or "Bee-wing" bran, the germ and the offal or fibrous material, obtained in the last reductions in milling.

White Shorts or White Middlings consists of a smaller portion of the fine bran particles and the germ and a much greater portion of the fibrous offal from the "tail of the mill."

Red Dog consists of a mixture of low-grade flour, fine particles of bran and the fibrous offal from the "tail of the mill."

Wheat Mixed Feed consists of pure wheat bran and the gray or total

shorts or middlings combined in the proportions obtained in the usual process of commercial milling.

Wheat Bran and Standard Middlings consists of the two commodities as defined above mixed in the proportions obtained in the usual process of commercial milling.

(NOTE—If to any of the foregoing brands of feed there should be added screenings, or scourings, as hereinafter defined, either ground or unground, bolted or unbolted, such brand shall be so registered, labeled and sold as clearly to indicate this fact. The word "Screenings" or "Scourings," as the case may be, shall appear as a part of the name or brand and shall be printed in the same size and face of type as the remainder of the brand name.)

Screenings consists of the smaller imperfect grains, weed seeds and other foreign materials having feeding value separated in cleaning the grain.

Scourings consists of such portions of the cuticle, brush, white caps, dust smut, and other materials as are separated from the grain in the usual commercial process of scouring.

COURT CASES.

Two cases of violation of the law were prosecuted during the year.

The first instance was against the Watson-Higgins Milling Co., Grand Rapids, Michigan for shipping unlicensed and untagged hog feed. The shipment in question was made to the Whalen Grain & Produce Co., Sparta, Michigan, and was invoiced as "Corn feed meal." A corrected invoice sent later listed the shipment as "Hog meal." Examination of the sample showed it to be composed of corn feed meal, wheat, oats, buckwheat and screenings. Notice of the violation was sent to Watson-Higgins Milling Co. They failed to make any explanation of the violation and the evidence was accordingly presented to the prosecuting attorney of Kent County. The case was tried before Justice Beebe at Sparta who rendered a decision for the people and imposed a fine of \$25.

An appeal was made to the Circuit Court but the Judge ruled the case out on technical grounds.

The second case was against the Wm. A. Coombs Milling Co., Coldwater, Michigan. This company persisted in shipping "Wheat bran with screenings not exceeding mill run" without complying with the law. One shipment was found being offered for sale by the Bronson Milling Co., Bronson, Michigan in which the screenings were present in large quantities. Complaint was accordingly made and before the case came to trial an officer of the company appeared before the Justice, plead guilty and paid the fine of \$25.00 that was imposed. They also complied with the law and took out a license, thus permitting the sale of the bran and screenings.

DISCUSSIONS OF RESULTS.

In the following tables are given the results of analyses of 1530 feeds, twenty-two of which are not subject to license. Of the 1508 licensed feeds 97 (6.4%) were below guarantee in protein; seventy two (4.8%) were deficient in crude fat and one hundred twenty-six or 8.4% contained an excess of crude fiber. These figures show a very satisfactory reduction in the number of violations of the feeding stuffs law. There has been a steady decrease each year in the number of feeds that have failed to conform to guarantee as is shown by the following table:

Year ending July 1,	1916	1917	1918	1919
Deficient in protein.....	15%	11%	8.3%	6.4%
Deficient in crude fat.....	11.5	8	7.5	4.8
Excess of fiber.....	9.9	15.1	12.5	8.4

In making these computations the following allowances for variations from guarantee were made, protein 1.0 per cent, fat 0.5 per cent and fiber 1.0 per cent.

All samples of mixed feeds were examined microscopically to determine the ingredients and those identified are given in the table of analyses. It is not claimed that *every* ingredient in each feed was identified as a material could be present in so small a quantity as to make its identification almost if not quite impossible.

The term "Oat meal mill by-product" will frequently appear in the list of ingredients. In all cases this refers to oat hulls, oat shorts and oat middlings in the proportion, presumably, in which they occur as by-products in the manufacture of oat meal, which is approximately as follows: oat hulls 90 per cent, oat shorts 8 per cent, oat middlings 2 per cent. This product is essentially oat hulls and the analysis shows it to possess only a very slightly higher feeding value than the clear hulls.

Concerning samples No. B 4448 Ryde's Milk Mash and No. B 4853 Ryde's Cream Calf Meal, Ryde & Co., in explanation for the high crude fiber results, state that they received a poor grade of alfalfa meal, some of which was used before the poor quality was detected and further that in moving to a new plant some difficulties were experienced with labor and machinery.

A discussion of the results for each class of feeding-stuffs follows:

COTTONSEED MEAL.

One hundred forty three samples of cottonseed meal, 37 more than last year, were analyzed. A great majority of these were the "good" grade, guaranteed to contain 36 per cent protein. This is the lowest grade of meal recognized and is made by adulterating the higher grade

meals with hulls or by adding hulls to the kernels before pressing out the oil.

During the first year of feed inspection, by this office, practically all of the cottonseed shipped into the State was tagged as 41 per cent meal but the actual quality was no better than that shipped during the past year tagged as 36 per cent meal, and 51 per cent of all shipments were below guarantee in protein while during the past year only 14.7 per cent of the inspected shipments were below guarantee in protein.

While one result of the feed inspection has been to bring about a more truthful labelling of the meal it is to be regretted that it has not, at the same time, resulted in raising the standard of quality. This, however, can only be brought about by the consumers demanding the higher grade meals. Only three shipments of "Choice" meal (41% protein) were found in the State during the past year and two of these were found to be below guarantee in protein and above in crude fiber.

Retail prices obtained by the inspectors for the 36 per cent meal ranged from \$50.00 per ton to \$4.00 per cwt., the average being \$65.40. The average percentages for protein and fat were 36.7 and 6.7 respectively.

Six samples of "Prime" cottonseed meal (38.6% protein) were drawn, one of which was below guarantee in protein and three contained an excess of fiber. The average retail price was \$66.70 and the average percentages for protein and fat were 38.6 and 6.7 respectively.

COTTONSEED FEED.

Of eleven samples of cottonseed feed drawn all were found to be equal to or above the guaranteed analysis. This feed is not popular with Michigan feeders and as a rule the difference in price between cottonseed feed and cottonseed meal is not commensurate with the difference in feeding value as the following table will show:

	Average protein %	Average fat %	Average retail price.	Pounds for one dollar.	
				Protein.	Fat.
Cottonseed meal—					
36% grade.....	36.7	6.7	\$65.40	11.2	2.0
38.6%.....	38.6	6.7	66.70	11.6	2.0
Cottonseed feed.....	20.2	3.7	53.18	7.6	1.4

LINSEED MEAL.

Sixty nine samples of this feed were collected and analyzed. All were fully equal to the guarantees in every respect. Retail prices were found to range from \$60 per ton to \$4.75 per cwt.

DISTILLERS GRAINS.

This class of feed is fast disappearing from the market and during the past year only one sample was found. This was found to be deficient in fat.

YEAST AND VINEGAR GRAINS.

Only two samples of this class of feed were taken both of which were equal to guarantee. This feed is sometimes confused with brewers' grains and by some feed manufacturers is used in place of brewers' grains when the latter is declared. In mixed feeds containing a number of ingredients it is very difficult to distinguish between yeast or vinegar grains and brewers' grains. The yeast and vinegar grains are inferior to brewers' grains as they have less protein and considerably more fiber.

MALT GRAINS.

This feed is quite similar to brewers' grains and can well be substituted for them in mixed rations. It was offered for sale at an average price of \$53.75 per ton. The five samples taken were in no way deficient.

GLUTEN FEED.

Samples were drawn from eighteen lots of gluten feed ranging in price from \$56 to \$70. Five samples were below guarantee in protein. None were deficient in fat or contained an excess of crude fiber.

HOMINY FEED.

Eleven samples of hominy feed were taken representing the product of six manufacturers. All samples conformed closely to guarantee except one which was low in protein. This feed retailed at prices between \$53.50 and \$60.00 per ton.

CORN GERM MEAL.

But six lots of corn germ meal were sampled, all the product of one concern. With the exception of one sample which was deficient in protein, all were well above the guarantees for protein and fat. Corn germ meal is the residue from corn germs after the corn oil has been extracted. It has a feeding value about equal to wheat middlings. The average price of the shipments sampled was \$62 per ton.

CORN FEED MEAL.

The analyses of 13 samples of corn feed meal are shown in the tables. Of this number three were below guarantee in both protein and fat and one in fat only. The average percentage of fat found in these four samples was 3.5 while the average guarantee was 7.8 per cent. Such a variation between the guaranteed and found results indicates gross carelessness on the part of the manufacturers. The retail price varied from \$2.30 per cwt. for a lot sampled late in the fall of 1918 to \$72.00 per ton for a shipment found in June 1919.

ANIMAL BY-PRODUCTS.

In this classification are included digester tankage of all grades, meat scraps and meal and poultry bone. Four of the 27 samples collected were below guarantee in protein; practically all were above the guarantee for fat and but one contained an excess of crude fiber.

DRIED BEET PULP.

Seven samples of this product were analyzed and all were found to conform closely to the guaranteed analysis. Prices on this feed varied from \$46 to \$55 per ton.

ALFALFA MEAL.

No deficiencies are found in the results of analysis of seven samples of alfalfa meal. The highest priced lot was offered for sale at \$56.10 per ton and the lowest price, \$40, was found in a town less than ten miles distant from the former. An explanation for a difference of \$16.10 per ton on two lots of the same sort of feed, sold under practically the same guarantee, is difficult to find.

CALF MEALS.

The average analysis of 40 samples of calf meal collected during the past year is as follows: protein 23.7%, fat 5.2%, crude fiber 5.6%. The average price was \$6.43 per cwt., but instances were found where the price was \$15 and even \$20 for meals having no unusual composition. Nine of the samples (22.5%) were deficient in protein; 10 or 25% were deficient in fat; and six (15%) contained an excess of fiber. There can be no legitimate excuse for so many failures to comply with guaranteed analysis in one class of feeds. Manufacturers should reduce their guarantees to conform with the analysis of their particular feeds or better the quality of the feeds to meet the guarantees. Purchasers should remember, that according to the results obtained last year, in buying calf meal they stand approximately one chance in four of getting an article that is below guarantee and that at a high price.

HOG FEEDS.

Results on 58 samples of hog feeds are reported this year; of this number 8.6% were below guarantee in protein; 5.2% were below in fat; and 12.1% contained an excess of fiber over the guarantee. The average analysis was protein 15.9%, fat 4.3% and fiber 7.9%. The lowest price was \$42.00 per ton and the highest \$5.00 per cwt., the latter being for a feed similar to a calf meal and intended for weanling pigs.

DAIRY AND STOCK FEEDS.

Two hundred and seventy-three samples were collected and analyzed. Eighteen or 6.6% and 19 or 7% were below guarantee in protein and fat respectively and 27 or 9.9% contained an excess of fiber. This is a marked improvement over last year when the corresponding figures were 7.1%, 20.3% and 15.9%. While the price of this class of feed has increased tremendously during the past three years the rate of increase has not been out of proportion to the increases noted for the other classes of feed.

In examining the lists of ingredients used in compounding the various dairy feeds it will be observed that a large number of materials are used in which a wide range in digestibility occurs. In purchasing dairy feeds on the present market one should carefully study the composition and avoid those that contain large amounts of low grade feed.

In order to better show the average percentage composition, the dairy and stock feeds are given under separate headings in the table of summaries while in the table giving the detail of inspection the two classes are combined. This is true of these feeds both with and without molasses.

MOLASSES DAIRY AND STOCK FEEDS.

Of this class of feeding stuffs, 80 in number, 10% were deficient in protein; six or 7.5% were deficient in fat, and 13 (16.3%) contained an excess of fiber. The corresponding percentages reported last year were 19.5, 13.0 and 35.1. This shows a commendable decrease in the number of deficiencies.

HORSE FEEDS.

Samples of 18 horse feeds containing no molasses were analyzed and all conformed to guarantee except one which was high in fiber content. A majority of these feeds was a mixture of hominy feed, corn feed meal, and ground oat meal mill by-products with small amounts of salt added. Others consisted of mixtures of rolled or crushed corn, oats and barley.

Results of analysis on 48 samples of molasses horse feeds are tabulated. One sample (2.1%) was deficient in protein; all were equal to guarantee in fat; and 4 (8.3%) contained an excess of crude fiber. With but few exceptions alfalfa meal is the base of these feeds with some grain, usually corn and oats, and molasses added. The price is not far different from that of the horse feeds previously mentioned, being from \$51 to \$66 per ton.

POULTRY FEEDS.

Four hundred and five samples of poultry feed were analyzed of which 333 were scratch feeds, chick feeds and pigeon feeds; and 72 were mash feeds. Of the total number 2.2% were below guarantee in protein; 2.5% in fat; and 2.5% were above in crude fiber. Many of the apparent deficiencies were due to unwise guarantees rather than poor quality of the feed. The average analysis of poultry feeds, other than the mashes was found to be as follows: protein 10.5%, fat 3.0%, fiber 3.2%. When compared with the usual guarantee of 10% protein, 2.5% fat, and 5% fiber which is used by most of the larger manufacturers it is observed that a safe margin for variation is allowed. Poultry feeds sold under this guarantee rarely show a deficiency.

The average analysis and price of poultry feeds, other than mashes, containing no grit were compared with similar figures for feeds containing grit to determine which class of feed represented the more economical purchase. The average analysis of 211 samples without grit was found to be 10.5% protein, 3.0% fat and 3.8% fiber; the average of 57 samples containing grit was 10.1% protein, 3% fat and 3.5% fiber. The "no grit" feeds sold at an average price of \$3.99 per cwt. and the "with grit" at \$3.76 per cwt., a difference of 23 cents. Assuming an estimated grit content of 5% the average analysis of the latter class on a grit free basis would be 10.6%, 3.2% and 3.7% for protein, fat and fiber respectively which corresponds closely to that of feeds with no grit. It is seen then that the reduction of 23 cents in the price of feeds containing

grit represents the value of the 5 pounds of grain in each 100 pounds of feed which has been replaced with grit. Putting a value of 1 cent per pound on grit it is found that the price on a grit free basis of feeds containing this material would be \$3.91 per cwt. From the past year's figures it would appear that there is practically no difference in the actual purchase price of grains whether a feed does or does not contain grit. However, purchasers are advised to investigate the price of both classes of feeds before buying as local prices often vary widely from the average.

CORN AND OAT FEEDS.

Most of the feeds in this class are composed largely of corn feed meal mixed with oat meal mill by-products with oats sometimes added. The analyses of the 28 samples collected show 2 or 7.1% below guarantee in protein, 9 or 32.1% low in fat, and 12 or 42.9% high in fiber. Here again the variation is largely due to unwise guarantees.

WHEAT BRAN.

The action of the Federal Food Administration in putting a low fixed price on wheat mill feeds brought them on the market in unusual quantities. During the present year 122 samples of wheat bran were collected as compared with 49 samples last year. Only 4 samples were below guarantee in protein and all were equal to guarantee for fat. Ten (8.2%) contained fiber in excess of the guarantee.

Wheat brans containing no ground screenings are not included in this class as the pure product does not require registration and consequently but few of the pure brans analyzed were guaranteed. The same is true of wheat middlings and wheat mixed feed.

WHEAT MIDDLINGS.

One hundred fifteen samples of wheat middlings were analyzed during the year. Of this number one sample was low in protein, seven in fat and nine high in fiber. Both standard and flour middlings are included in the list. The average analysis was found to be 16.9% protein, 5.1% fat and 7.5% crude fiber. Prices were found to vary from \$34.66 to \$60.00 per ton. The first was the government price in bulk at the mill and the latter the highest price found after restrictions had been removed.

WHEAT MIXED FEEDS.

Wheat mixed feed or shipstuff is the mixture of wheat bran and middlings as it comes from the mill in the manufacture of flour. Nineteen samples of such feed were drawn and all were found to be equal to guarantee in every respect.

WHEAT AND RYE MIXED FEEDS.

Eight samples were analyzed and all found to conform to guarantee except one which was high in fiber content. These feeds consisted of a mixture of wheat and rye middlings with ground screenings.

RYE FEED.

Rye feed corresponds to, and is derived in the same manner from rye as wheat mixed feed is derived from wheat. The average analysis of the eight samples collected was found to be 15.6% protein, 3.5% fat and 5.4% fiber. Four samples were below guarantee in protein and one was above in crude fiber.

OAT MEAL MILL BY-PRODUCTS.

Analyses of 14 oat feeds are tabulated and there is shown one deficiency each in protein and fat with two samples having an excess of fiber. Of the 14 feeds, 9 were the ground entire by-product consisting of oat hulls, oat shorts and oat middlings; five were ground oat hulls alone. The average analysis shown in the table of summaries is 6.0% protein, 1.9% fat and 27.4% crude fiber. The average selling price was \$30.38.

As is pointed out in a previous paragraph, about 90% of this by-product feed is oat hulls. In view of the fact that but 54% of the total dry matter in oat hulls is digestible, the feed has unquestionably low feeding value. Henry and Morrison give the value of oat hulls as, "only little, if any above that of oat straw." Few feeders would pay thirty dollars per ton for ground oat straw.

BARLEY FEED.

Six samples were analyzed one of which was below guarantee in protein and one contained an excess of fiber. Uniformity in the composition of the various samples was lacking; one sample was pure barley hulls; two were barley hulls with barley screenings; and three were a mixture of the hulls, bran, middlings and screenings. The last mentioned is the true barley mill feed with screenings or barley mixed feed with screenings and is the only sort which should be so labelled. Any other barley by-product should be so named as to designate its true composition.

CEREAL FOOD BY-PRODUCTS.

Of the 27 samples of this class of feed one is deficient in protein and one in fat. A great variety of products is found in this class with a similar variety of guarantees.

MISCELLANEOUS FEEDS.

Under this heading are included two samples of peanut bran, two of pea bran, one of wheat scourings, a sample of ground flaxseed screenings and grain screenings, and one condimental stock food. None were deficient in protein or fat and but one exceeded the guaranteed percentage of fiber.

COMMERCIAL FEEDING STUFFS.

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SUMMARY OF INSPECTION.

Feeds.	Number of samples analyzed.	Protein.		Fat.		Crude Fiber.	
		Average per cent.	Deficient.	Average per cent.	Deficient.	Average per cent.	Excess.
			No. Per cent.		No. Per cent.		No. Per cent.
Cottonseed Meal.....	143	37.5	21 14.7	6.4	1 0.7	13.4	20 14.0
Cottonseed Feed.....	11	20.2	0 0.0	3.7	0 0.0	22.8	0 0.0
Linseed Meal.....	69	34.9	0 0.0	6.7	0 0.0	7.8	0 0.0
Distillers Grains.....	1	32.6	0 0.0	8.0	1 100.0	11.2	0 0.0
Yeast and Vinegar Grains.....	2	19.0	0 0.0	6.0	0 0.0	15.0	0 0.0
Malt Grains.....	5	29.8	0 0.0	5.9	0 0.0	11.1	0 0.0
Gluten Feed.....	18	23.3	5 27.7	4.0	0 0.0	7.0	0 0.0
Hominy Feed.....	9	10.3	1 11.1	6.2	0 0.0	4.0	0 0.0
Corn Germ Meal.....	6	20.7	1 16.6	10.2	0 0.0	9.2	0 0.0
Corn Feed Meal.....	13	9.4	3 23.1	5.4	4 30.8	3.6	0 0.0
Animal By-Products.....	27	53.5	4 14.8	9.0	0 0.0	2.1	1 3.7
Dried Beet Pulp.....	7	8.8	0 0.0	0.9	0 0.0	18.6	0 0.0
Alfalfa Meal.....	7	14.8	0 0.0	1.5	0 0.0	29.2	0 0.0
Calf Meals.....	40	23.7	9 22.5	5.2	10 25.0	5.6	6 15.0
Hog Feeds.....	58	15.9	5 8.6	4.3	3 5.2	7.9	7 12.1
Dairy Feeds.....	139	21.4	18 13.0	5.0	14 10.1	10.9	17 12.2
Molasses Dairy Feeds.....	74	19.0	8 10.8	4.5	6 8.1	14.2	13 17.5
Stock Feeds.....	34	11.2	0 0.0	3.9	5 14.7	10.6	10 29.4
Molasses Stock Feeds.....	6	10.3	0 0.0	2.8	0 0.0	12.5	0 0.0
Horse Feeds.....	18	9.4	0 0.0	3.9	0 0.0	7.1	1 5.6
Molasses Horse Feeds.....	48	10.7	1 2.1	2.8	0 0.0	11.4	4 8.3
Poultry Mash Feeds.....	72	17.0	5 6.9	4.6	3 4.2	7.5	3 4.2
Scratch Feeds, Chick Feeds, Pigeon Feeds.....	333	10.5	4 1.2	3.0	7 2.1	3.2	7 2.1
Corn and Oat Feeds.....	28	9.1	2 7.1	4.4	9 32.1	7.5	12 42.9
Wheat Bran.....	122	15.2	4 3.3	4.7	0 0.0	10.4	10 8.2
Wheat Middlings.....	115	16.9	1 0.9	5.1	7 6.1	7.5	9 7.8
Wheat Mixed Feed.....	19	16.6	0 0.0	4.6	0 0.0	8.2	0 0.0
Wheat and Rye Mixed Feeds.....	8	16.2	0 0.0	4.1	0 0.0	7.2	1 12.5
Rye Feed.....	8	15.6	2 25.0	3.5	0 0.0	5.4	1 12.5
Oat Meal Mill By-Products.....	14	6.0	1 7.1	1.9	1 7.1	27.4	2 14.2
Barley Feed.....	6	11.1	1 16.7	2.8	0 0.0	15.2	1 16.7
Cereal Food By-Products.....	27	12.2	0 0.0	2.0	1 3.7	6.9	0 0.0
Miscellaneous Feeds.....	7	.....	1 14.3	.....	0 0.0	.....	1 14.3
Feeds requiring no license.....	22	.....	.....	.....	.....	.....	.....
Totals.....	1530	.....	97 *6.4	.....	72 *4.8	.....	126 *8.4

*Percentages calculated on 1 508 samples of licensed feeds.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
COTTONSEED MEAL.							
American Cotton Oil Co., New York, N. Y.							
B 3350	Surety Brand Cottonseed Meal	Detroit { G.*	9.3	36.0	5.5	14.0	
B 3454	Surety Brand Cottonseed Meal	Zeeland { F.*	9.7	36.4	6.4	11.5	\$60.00
B 3628	Surety Brand Cottonseed Meal	Detroit	7.6	35.6	6.2	15.1	63.00
B 3644	Surety Brand Cottonseed Meal	Detroit	8.6	37.9	6.1	13.8	60.25
B 3665	Surety Brand Cottonseed Meal	Lansing	8.9	32.8	6.1	17.4	65.00
B 3750	Surety Brand Cottonseed Meal	Lansing	8.8	34.3	6.7	15.2	
B 3972	Surety Brand Cottonseed Meal	Clare	6.8	34.9	6.8	15.5	66.00
B 4075	Surety Brand Cottonseed Meal	Caro	8.8	35.9	5.9	14.4	64.00
B 4140	Surety Brand Cottonseed Meal	Minden City	7.3	36.1	5.9	15.2	64.00
B 4232	Surety Brand Cottonseed Meal	Harlem	9.2	33.9	6.5	15.5	65.00
B 4285	Surety Brand Cottonseed Meal	Holland	7.6	36.7	7.7	14.6	66.00
B 4331	Surety Brand Cottonseed Meal	Sault Ste. Marie	8.4	36.1	6.3	14.5	74.00
B 4345	Surety Brand Cottonseed Meal	Marquette	8.0	36.2	7.2	11.5	3.40
B 4457	Surety Brand Cottonseed Meal	Grand Ledge	7.9	35.9	5.9	15.9	63.50
B 4705	Surety Brand Cottonseed Meal	Oxford	9.0	33.9	6.1	14.0	3.40
B 4887	Surety Brand Cottonseed Meal	Harbor Beach	9.0	37.0	8.7	11.9	3.75
B 5000	Surety Brand Cottonseed Meal	Romeo	8.8	37.0	7.8	13.2	3.50
Average			8.5	35.8	6.6	14.2	
J. E. Bartlett Co., Jackson, Mich.							
B 4002	Farmer Brand Prime Cottonseed Meal	Fowlerville { G.*	7.5	38.6	5.0	18.0	
				39.9	7.1	11.4	
Average				39.0	5.0	17.0	
B 3194	Farmer Brand Straight Cottonseed Meal	Grand Rapids { F.*	8.6	36.4	7.3	10.5	
B 3627	Farmer Brand Straight Cottonseed Meal	Ortonville	8.3	31.5	5.9	17.3	\$60.60
B 3899	Farmer Brand Straight Cottonseed Meal	Coopersville	8.5	36.8	7.3	11.3	63.00
B 3932	Farmer Brand Straight Cottonseed Meal	Ionis	9.5	30.2	5.9	17.6	62.00
B 3983	Farmer Brand Straight Cottonseed Meal	Mulliken	9.6	35.6	7.2	11.1	66.00
B 3994	Farmer Brand Straight Cottonseed Meal	Eaton Rapids	8.9	37.1	7.7	11.5	
B 4059	Farmer Brand Straight Cottonseed Meal	Bay City	8.6	35.3	6.4	13.8	65.00
B 4147	Farmer Brand Straight Cottonseed Meal	Brown City	8.8	34.9	6.2	14.8	3.05
B 4213	Farmer Brand Straight Cottonseed Meal	Three Oaks	8.7	37.7	7.4	13.7	
B 4405	Farmer Brand Straight Cottonseed Meal	Clinton	9.2	38.6	6.3	13.0	64.00
B 4460	Farmer Brand Straight Cottonseed Meal	Grand Ledge	8.6	36.6	5.9	13.1	63.50
B 4480	Farmer Brand Straight Cottonseed Meal	Holly	8.8	38.6	5.9	13.0	3.25
B 4805	Farmer Brand Straight Cottonseed Meal	Petoskey	7.4	37.4	6.1	14.3	3.50
B 4889	Farmer Brand Straight Cottonseed Meal	Elm	8.3	37.6	6.3	13.3	65.00
B 4907	Farmer Brand Straight Cottonseed Meal	Denton	8.1	41.0	7.2	11.2	3.25
B 4912	Farmer Brand Straight Cottonseed Meal	Wayne	8.7	35.9	5.9	14.3	
B 4921	Farmer Brand Straight Cottonseed Meal	Plvmouth	7.7	37.7	7.1	12.1	
B 4925	Farmer Brand Straight Cottonseed Meal	Milford	8.4	38.8	7.6	11.8	64.00
B 4931	Farmer Brand Straight Cottonseed Meal	Pontiac	8.3	36.4	6.3	14.7	66.50
B 4962	Farmer Brand Straight Cottonseed Meal	Port Huron	7.6	38.3	8.4	13.3	65.00
Average			8.5	36.6	6.7	13.3	
F. W. Brode & Co., Memphis, Tenn.							
B 4455	Owl Brand H. G. Cottonseed Meal	Caro { G.*	7.9	41.0	6.0	10.0	
B 4456	Owl Brand H. G. Cottonseed Meal	Caro { F.*	8.2	36.5	7.0	15.5	\$69.00
Average			8.1	38.5	6.9	13.3	
B 4209	Dove Brand Prime Cottonseed Meal	Niles { G.*	8.0	38.6	6.0	10.0	
B 4235	Dove Brand Prime Cottonseed Meal	Sparta { F.*	8.6	39.5	6.2	12.9	68.00
B 4829	Dove Brand Prime Cottonseed Meal	Traverse City	9.2	37.6	7.6	10.9	65.00
Average			8.6	38.2	6.8	12.6	3.50
B 3186	Jay Brand Cottonseed Meal	Marshall { G.*	9.4	36.3	7.8	11.6	50.00
B 4040	Jay Brand Cottonseed Meal	Saginaw { F.*	8.3	35.8	6.3	15.1	3.30
B 4287	Jay Brand Cottonseed Meal	Holland	8.3	37.9	6.5	13.5	66.00
B 4454	Jay Brand Cottonseed Meal	Alpena	8.7	33.0	6.8	16.3	67.00
B 4683	Jay Brand Cottonseed Meal	Zeeland	8.8	36.0	6.5	14.7	65.00
B 4844	Jay Brand Cottonseed Meal	Traverse City	8.3	35.2	6.0	13.8	3.40
B 4899	Jay Brand Cottonseed Meal	Flat Rock	9.1	37.4	6.9	12.7	3.40

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
F. W. Brode & Co., Memphis, Tenn.—Con.							
B 4946	Jay Brand Cottonseed Meal.....	Grand Blanc.....	8.8	36.6	7.4	15.1	\$65.00
B 4022	Jay Brand Cottonseed Meal.....	Coldwater.....	8.9	35.1	5.9	13.2	64.00
B 4554	Jay Brand Cottonseed Meal.....	Menominee.....	8.0	34.5	6.4	13.8	3.75
		Average.....	8.7	35.8	6.7	14.0	.....
Buckeye Cotton Oil Co., Cincinnati, Ohio.							
B 4308	Buckeye Good Cottonseed Meal.....	Twining.....	{ G.* F.*		36.0	5.0	14.0
B 4414	Buckeye Good Cottonseed Meal.....	Ann Arbor.....	8.4	34.9	7.3	12.6	4.00
B 4441	Buckeye Good Cottonseed Meal.....	Dundee.....	8.7	34.8	6.0	15.0	3.30
B 4710	Buckeye Good Cottonseed Meal.....	Utica.....	7.5	36.9	5.8	12.8	3.30
		.....	7.2	36.8	6.4	12.2	3.30
		Average.....	8.0	35.9	6.4	13.2	.....
S. P. Davis, Little Rock, Ark.							
B 4616	Good Luck Brand Cottonseed Meal.....	Charlevoix.....	{ G.* F.*		41.0	6.0	9.0
		.....	9.3	37.0	7.6	14.6	.....
B 4103	Beauty Brand Cottonseed Meal.....	Cass City.....	{ G.* F.*		36.0	6.0	16.0
B 4499	Beauty Brand Cottonseed Meal.....	Ypsilanti.....	9.5	34.3	6.0	13.6	63.50
		.....	8.8	40.3	7.0	12.2	3.30
		Average.....	9.2	37.3	6.5	12.9	.....
Albert Dickinson Co., Chicago, Ill.							
B 4597	Cottonseed Meal.....	Petoskey.....	{ G.* F.*		36.0	6.0	14.0
B 4741	Cottonseed Meal.....	Hillsdale.....	8.6	35.0	6.0	15.8	69.00
B 4808	Cottonseed Meal.....	Gaylord.....	10.3	38.4	6.9	11.3	3.35
		.....	8.0	34.8	6.3	14.3	3.40
		Average.....	9.0	36.1	6.4	13.7	.....
East St. Louis Cotton Oil Co., National Stock Yards, Ill.							
B 4417	East St. Louis Brand Cottonseed Meal.....	Milan.....	{ G.* F.*		38.6	6.0	18.0
		.....	8.6	38.8	5.6	13.3	68.50
B 3349	St. Clair Brand Cottonseed Meal.....	Detroit.....	{ G.* F.*		36.0	5.0	16.0
B 3407	St. Clair Brand Cottonseed Meal.....	Coopersville.....	9.0	35.9	5.9	12.0	60.00
B 3496	St. Clair Brand Cottonseed Meal.....	Zeeland.....	8.3	37.1	6.4	11.0	55.00
B 3748	St. Clair Brand Cottonseed Meal.....	Perry.....	9.3	36.5	6.5	15.3	63.00
B 3759	St. Clair Brand Cottonseed Meal.....	Howell.....	9.5	38.8	6.0	12.0	65.00
B 3872	St. Clair Brand Cottonseed Meal.....	Allegan.....	8.7	37.1	6.7	11.2	63.00
B 3894	St. Clair Brand Cottonseed Meal.....	Muskegon.....	8.5	38.3	5.5	13.9	65.00
B 3902	St. Clair Brand Cottonseed Meal.....	Coopersville.....	9.0	36.0	5.8	14.5	61.50
B 3929	St. Clair Brand Cottonseed Meal.....	Holland.....	9.4	36.0	5.7	13.4	63.00
B 3936	St. Clair Brand Cottonseed Meal.....	Plainwell.....	8.7	35.2	5.4	14.3	65.00
B 3942	St. Clair Brand Cottonseed Meal.....	Kalamazoo.....	8.2	36.3	6.5	12.4	60.00
B 3943	St. Clair Brand Cottonseed Meal.....	Kalamazoo.....	8.3	35.8	5.6	12.8	62.00
B 3963	St. Clair Brand Cottonseed Meal.....	Ithaca.....	7.8	40.9	6.0	11.6	63.00
B 3999	St. Clair Brand Cottonseed Meal.....	Hastings.....	7.7	37.0	5.5	13.9	65.00
B 4005	St. Clair Brand Cottonseed Meal.....	Albion.....	8.6	39.0	6.1	13.1	68.00
B 4023	St. Clair Brand Cottonseed Meal.....	Coldwater.....	8.0	37.1	5.8	14.8	44.00
B 4049	St. Clair Brand Cottonseed Meal.....	Saginaw.....	8.6	35.9	5.5	13.7	.....
B 4121	St. Clair Brand Cottonseed Meal.....	Harbor Beach.....	7.6	34.5	6.2	13.9	3.25
B 4189	St. Clair Brand Cottonseed Meal.....	Hudson.....	9.1	36.2	6.0	13.5	63.60
B 4195	St. Clair Brand Cottonseed Meal.....	Adrian.....	8.9	35.4	5.1	14.8	63.00
B 4272	St. Clair Brand Cottonseed Meal.....	Battle Creek.....	8.5	39.4	6.0	12.2	62.50
B 4278	St. Clair Brand Cottonseed Meal.....	Galesburg.....	8.7	36.6	5.9	13.9	65.00
B 4280	St. Clair Brand Cottonseed Meal.....	Jameson.....	9.1	38.7	5.8	11.7	65.00
B 4291	St. Clair Brand Cottonseed Meal.....	Grandville.....	8.1	37.6	5.9	14.4	63.00
B 4297	St. Clair Brand Cottonseed Meal.....	Coopersville.....	8.1	37.3	5.7	13.4	65.00
B 4298	St. Clair Brand Cottonseed Meal.....	Allegan.....	8.7	36.5	6.7	14.3	63.00
B 4419	St. Clair Brand Cottonseed Meal.....	Morenci.....	9.4	36.3	8.5	12.9	64.00
B 4431	St. Clair Brand Cottonseed Meal.....	Blissfield.....	8.6	37.4	5.8	14.0	3.25
B 4449	St. Clair Brand Cottonseed Meal.....	Leslie.....	8.2	38.7	6.5	12.3	.....
B 4463	St. Clair Brand Cottonseed Meal.....	Flint.....	8.1	37.0	5.6	14.5	3.25
B 4469	St. Clair Brand Cottonseed Meal.....	Flint.....	8.6	37.3	6.3	13.0	66.00
B 4481	St. Clair Brand Cottonseed Meal.....	Flint.....	9.8	35.9	5.7	14.0	66.00
B 4493	St. Clair Brand Cottonseed Meal.....	Flint.....	9.1	36.6	6.3	13.7	66.00
B 4609	St. Clair Brand Cottonseed Meal.....	Ypsilanti.....	9.1	36.3	6.8	11.6	3.35
B 4727	St. Clair Brand Cottonseed Meal.....	Vriesland.....	8.3	36.5	5.9	13.9	65.00
		Trenton.....	8.1	37.1	5.8	14.3	65.00

Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or ovt.
East St. Louis Cotton Oil Co., National Stock Yards, Ill.—Con.							
B 4736	St. Clair Brand Cottonseed Meal.....	Bronson.....	8.3	37.8	6.9	11.2	\$3.26
B 4748	St. Clair Brand Cottonseed Meal.....	Albion.....	7.4	37.2	7.0	13.8	65.00
B 4894	St. Clair Brand Cottonseed Meal.....	Wayne.....	8.7	37.3	6.8	13.9	3.25
B 4897	St. Clair Brand Cottonseed Meal.....	Belleville.....	9.1	38.8	6.6	12.5	3.25
B 4906	St. Clair Brand Cottonseed Meal.....	Denton.....	8.9	37.5	5.9	13.2	3.25
B 4927	St. Clair Brand Cottonseed Meal.....	Northville.....	8.6	35.9	5.7	14.5	64.00
B 4928	St. Clair Brand Cottonseed Meal.....	Farmington.....	8.2	40.2	6.2	12.3	65.00
B 4940	St. Clair Brand Cottonseed Meal.....	Birmingham.....	8.0	37.4	7.0	13.6	65.00
B 4943	St. Clair Brand Cottonseed Meal.....	Detroit.....	8.4	37.5	6.0	13.3	3.30
B 4947	St. Clair Brand Cottonseed Meal.....	Davison.....	8.6	36.6	5.7	14.6	63.00
		Average.....	8.5	37.1	6.1	13.3	
Hales & Edwards Co., Chicago, Ill.							
B 3471	Cottonseed Meal.....	Grand Rapids..... { G.*		36.0	5.0	12.0	
B 4577	Cottonseed Meal.....	Grand Rapids..... { F.*	9.2	36.4	6.1	11.0	63.00
B 4810	Cottonseed Meal.....	Charlevoix.....	8.5	36.8	7.8	14.4	3.40
		Gaylord.....	8.5	35.7	5.7	12.2	4.00
		Average.....	8.7	36.3	6.5	12.9	
Humphreys Godwin Co., Memphis, Tenn.							
B 3916	Forfat Brand Cottonseed Meal.....	Casnovia..... { G.*		38.6	5.0	15.0	
		Casnovia..... { F.*	8.7	38.3	6.8	10.8	62.00
B 4283	Danish Brand Cottonseed Meal.....	Grand Rapids..... { G.*		36.0	5.0	15.0	
B 4557	Danish Brand Cottonseed Meal.....	Grand Rapids..... { F.*	8.2	35.5	5.3	13.9	64.50
B 4600	Danish Brand Cottonseed Meal.....	Spaulding.....	8.2	34.3	5.5	13.9	3.70
		Petokey.....	8.2	35.0	6.4	12.7	3.50
		Average.....	8.2	34.9	5.7	13.5	
Imperial Cotto Sales Co., Chicago, Ill.							
B 4319	Imperial Cotto Cottonseed Meal.....	Cheboygan..... { G.*		36.0	5.0	14.0	
		Cheboygan..... { F.*	9.0	35.7	5.6	13.0	70.00
C. L. Montgomery Co., Memphis, Tenn.							
B 4246	Star Brand Cottonseed Meal.....	Big Rapids..... { G.*		36.0	6.0	14.0	
B 4290	Star Brand Cottonseed Meal.....	Big Rapids..... { F.*	8.9	40.4	6.8	16.3	67.00
B 4886	Star Brand Cottonseed Meal.....	Coopersville.....	8.1	37.7	7.0	13.9	63.00
		Bad Axe.....	9.8	39.8	8.8	9.9	
		Average.....	8.9	39.3	7.5	13.4	
W. C. Nothern, Little Rock, Ark.							
B 4102	Standard Brand Cottonseed Meal.....	Cass City..... { G.*		36.0	5.0	12.0	
		Cass City..... { F.*	10.3	36.8	5.9	12.8	69.00
Southern Cotton Oil Co., Little Rock., Ark.							
B 4415	Scoco Brand Cottonseed Meal.....	Ann Arbor..... { G.*		36.0	5.5	14.0	
		Ann Arbor..... { F.*	8.5	36.2	5.5	17.1	3.30
Wagner White Co., Inc., Jackson, Mich.							
B 3913	Wawco Brand Cottonseed Meal.....	Belmont..... { G.*		36.0	5.0	22.0	
B 3947	Wawco Brand Cottonseed Meal.....	Belmont..... { F.*	8.7	40.9	8.4	10.6	65.00
B 4401	Wawco Brand Cottonseed Meal.....	Williamston.....	9.2	37.5	7.2	14.3	
B 4703	Wawco Brand Cottonseed Meal.....	Tecumseh.....	9.8	36.9	6.2	12.9	63.50
B 4713	Wawco Brand Cottonseed Meal.....	Saline.....	8.5	37.0	6.1	12.5	66.00
B 4926	Wawco Brand Cottonseed Meal.....	Rochester.....	8.8	37.2	6.1	12.5	3.40
B 4966	Wawco Brand Cottonseed Meal.....	Milford.....	8.8	39.3	7.1	12.4	63.00
B 4971	Wawco Brand Cottonseed Meal.....	Mt. Clemens.....	9.0	39.2	6.7	12.0	3.35
B 4981	Wawco Brand Cottonseed Meal.....	Mt. Clemens.....	9.1	36.8	5.9	13.3	65.00
		Williamston.....	8.6	37.0	5.7	12.8	
		Average.....	8.9	38.0	6.6	12.6	
E. L. Wellman, Grand Rapids, Mich.							
B 3795	Feeders Favorite Cottonseed Meal.....	Hartford..... { G.*		36.0	5.0	15.0	
B 3865	Feeders Favorite Cottonseed Meal.....	Hartford..... { F.*	8.8	32.4	5.5	15.8	64.00
B 3900	Feeders Favorite Cottonseed Meal.....	Allegan.....	7.5	37.9	5.6	11.7	65.00
B 3901	Feeders Favorite Cottonseed Meal.....	Coopersville.....	9.1	31.4	5.6	15.5	63.00
B 3909	Feeders Favorite Cottonseed Meal.....	Grand Rapids.....	8.3	34.8	6.2	16.8	
B 3950	Feeders Favorite Cottonseed Meal.....	Hudsonville.....	9.0	37.2	6.7	13.3	63.00
		Belding.....	8.0	37.2	5.8	12.8	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	E. L. Wellman, Grand Rapids, Mich.—Con.						
B 3982	Feeders Favorite Cottonseed Meal.....	Grand Rapids.....	9.4	37.1	6.7	12.6	\$67.00
B 3985	Feeders Favorite Cottonseed Meal.....	Lake Odessa.....	8.9	37.3	5.8	11.7	68.00
B 4239	Feeders Favorite Cottonseed Meal.....	Cadillac.....	7.1	39.6	7.3	12.7	66.00
B 4282	Feeders Favorite Cottonseed Meal.....	Grand Rapids.....	6.5	38.3	6.1	14.0	65.00
B 4572	Feeders Favorite Cottonseed Meal.....	Charlevoix.....	8.5	37.4	6.6	14.1	68.00
B 4813	Feeders Favorite Cottonseed Meal.....	Boyne City.....	7.2	42.0	6.5	11.7	3.70
		Average.....	8.2	36.9	6.2	13.6	.....
	COTTONSEED FEED.						
	American Cotton Oil Co., New York City, N. Y.						
B 3195	Columbia Cottonseed Feed.....	Grand Rapids..... { G.*	.....	20.5	5.0	25.0	.....
B 4588	Columbia Cottonseed Feed.....	East Jordan..... { F.*	10.7	21.1	4.2	20.6	50.00
			10.1	19.9	4.3	21.8	3.00
		Average.....	10.4	20.5	4.3	21.2	.....
	J. E. Bartlett Co., Jackson, Mich.						
B 4463	Bartlett's Cottonseed Feed Meal.....	Durand..... { G.*	.....	20.0	5.0	26.0	.....
			9.8	21.4	4.3	23.1	55.00
	Hayes Grain & Commission Co., Little Rock, Ark.						
B 3498	Uncle Joe Brand Cottonseed Feed.....	Zeeland..... { G.*	.....	20.0	5.0	23.0	.....
			10.0	20.6	3.0	23.4	54.00
	Humphreys Godwin Co., Memphis, Tenn.						
B 3196	77 Cottonseed Feed.....	Grand Rapids..... { G.*	.....	20.0	4.0	28.0	.....
B 3837	77 Cottonseed Feed.....	Wayland..... { F.*	10.1	20.2	3.8	21.8	50.00
B 4284	77 Cottonseed Feed.....	Grand Rapids.....	8.9	19.7	3.9	21.7	50.00
			9.2	19.8	3.9	22.9	54.00
		Average.....	9.4	19.9	3.9	22.1	.....
	Imperial Cotto Sales Co., Chicago, Ill.						
B 4318	Cottolene Brand Cottonseed Feed Meal.....	Cheboygan..... { G.*	.....	20.0	5.5	25.0	.....
			7.9	19.8	3.0	23.4	60.00
	Memphis Cotton Hull & Fiber Co., Memphis, Tenn.						
B 4459	Cyclone Cottonseed Feed.....	Grand Ledge..... { G.*	.....	20.0	5.0	26.0	.....
B 4929	Cyclone Cottonseed Feed.....	Farmington..... { F.*	9.0	20.5	3.5	23.8	50.00
			8.5	20.0	3.7	24.2	47.00
		Average.....	8.8	20.3	3.6	24.0	.....
	C. L. Montgomery & Co., Memphis, Tenn.						
B 3686	Globe Brand Cottonseed Feed.....	Lansing..... { G.*	.....	20.0	5.5	27.0	.....
			9.9	19.1	3.2	24.1	2.75
	LINSEED MEAL.						
	American Linseed Co., Chicago, Ill.						
B 3707	Old Process Linseed Oil Meal.....	St. Johns..... { G.*	.....	34.0	6.0	9.0	.....
B 4001	Old Process Linseed Oil Meal.....	Fowlerville..... { F.*	9.5	34.1	7.3	7.5	3.25
B 4214	Old Process Linseed Oil Meal.....	Three Oaks.....	9.7	37.3	5.6	7.2	.....
			9.4	36.4	6.0	8.3	.....
		Average.....	9.5	35.9	6.3	7.7	.....
	American Milling Co., Peoria, Ill.						
B 3191	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Grand Rapids..... { G.*	.....	30.0	5.0	10.0	.....
B 3477	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Comstock Park..... { F.*	9.5	31.7	6.5	8.7	.....
B 3585	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Albion.....	9.9	30.7	6.3	9.5	64.00
B 3845	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Belmont.....	10.0	31.9	6.7	9.0	3.35
			10.1	30.3	6.7	8.9	62.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or owl.
American Milling Co., Peoria, Ill.—Con.							
B 4392	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.	Ewen	9.8	30.9	7.3	9.1	\$4 75
B 4567	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.	Trout Lake	8.7	31.1	7.1	9.5	4 25
B 4568	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.	Charlevoix	9.5	32.6	6.6	8.8	3 70
		Average	9.6	31.3	6.7	9.1	
Archer Daniels Linseed Co., Minneapolis, Minn.							
B 4368	Old Process Ground Linseed Cake	Chaswell	G.* F.* 9.3	33.0 36.9	6.0 7.6	10.0 7.7	4 00
B 4386	Old Process Ground Linseed Cake	Ontonagon	9.2	34.9	6.9	8.3	4 00
B 4709	Old Process Ground Linseed Cake	Utica	10.1	35.0	7.6	8.0	3 75
		Average	9.5	35.6	7.4	8.0	
Chicago Heights Oil Mfg. Co., Chicago, Ill.							
B 3366	Old Process Laxo Cake Meal	Detroit	G.* F.* 9.1	25.0 28.2	6.0 7.4	12.0 4.6	60 00
B 3898	Old Process Laxo Cake Meal	Muskegon	10.1	29.3	7.6	9.1	60 00
		Average	9.6	28.8	7.5	6.9	
Wm. O. Goodrich Co., Milwaukee, Wis.							
B 3813	Old Process Ground Linseed Cake	Holland	G.* F.* 9.9	32.0 34.3	5.0 7.9	10.0 8.3	63 00
B 4831	Old Process Ground Linseed Cake	Traverse City	9.3	33.9	7.1	7.8	3 50
		Average	9.6	34.1	7.5	8.1	
Hirst & Begley Linseed Co., Chicago, Illinois.							
B 3168	Linseed Oil Meal	Grand Rapids	G.* F.* 9.0	34.0 37.8	6.0 6.3	9.0 7.6	
B 3430	Linseed Oil Meal	Grand Haven	9.8	35.4	6.5	8.0	67 00
B 3438	Linseed Oil Meal	Jamestown	10.6	34.3	5.9	8.0	62 00
B 3442	Linseed Oil Meal	Jamestown	9.5	36.8	6.8	7.0	62 00
B 3467	Linseed Oil Meal	Zeeland	9.8	36.3	5.8	7.7	65 00
B 3715	Linseed Oil Meal	Owosso	8.9	36.8	6.4	7.8	3 35
B 3823	Linseed Oil Meal	Holland	9.1	33.6	7.3	7.4	64 00
B 4224	Linseed Oil Meal	Hudsonville	9.8	35.1	6.7	8.2	70 00
B 4229	Linseed Oil Meal	Holland	9.5	34.3	7.1	9.4	75 00
B 4231	Linseed Oil Meal	Harlem	10.6	35.1	6.7	8.0	70 00
B 4233	Linseed Oil Meal	Muskegon	9.2	33.6	6.6	8.7	75 00
B 4824	Linseed Oil Meal	Kalkaska	8.6	36.1	6.3	8.2	3 90
		Average	8.5	35.4	6.5	8.0	
Spencer Kellogg & Sons, Buffalo, N. Y.							
B 3851	Pure Old Process Oil Meal	Sparta	G.* F.* 9.6	33.0 34.8	5.0 6.4	10.0 8.3	70 00
B 4230	Pure Old Process Oil Meal	Holland	9.3	34.7	6.4	8.7	75 00
B 4286	Pure Old Process Oil Meal	Holland	9.1	35.9	6.2	7.9	74 00
B 4578	Pure Old Process Oil Meal	Charlevoix	9.7	38.7	5.5	7.2	3 70
B 4744	Pure Old Process Oil Meal	Hillsdale	10.2	35.3	5.6	6.8	3 65
B 4934	Pure Old Process Oil Meal	Pontiac	8.7	37.8	5.8	7.4	70 00
		Average	9.4	36.2	6.0	7.7	
Metzger Seed & Oil Co., Toledo, Ohio.							
B 3601	Old Process Oil Meal	Albion	G.* F.* 10.3	30.0 34.5	5.0 6.7	10.0 7.6	3 25
B 3675	Old Process Oil Meal	Lansing	9.3	34.4	6.4	7.8	3 50
B 3855	Old Process Oil Meal	Moline	9.8	36.9	6.8	7.5	64 00
B 4026	Old Process Oil Meal	Saginaw	9.7	35.8	6.5	7.7	61 00
B 4064	Old Process Oil Meal	Bay City	8.8	32.4	7.0	8.1	3 50
B 4098	Old Process Oil Meal	Cass City	9.7	33.6	7.0	8.2	74 00
B 4245	Old Process Oil Meal	Big Rapids	9.8	35.8	7.5	7.9	78 00
B 4314	Old Process Oil Meal	Alpena	9.8	36.9	7.3	7.7	4 10
		Average	9.8	35.0	6.9	7.7	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Midland Linseed Products Co., Minneapolis, Minn.							
B 3183	Argentine Brand Pure Old Process Ground Linseed Cake	Coopersville. { G.*	30.0	5.0	9.5		
B 3495	Argentine Brand Pure Old Process Ground Linseed Cake	Coopersville. { F.*	9.1	34.6	7.6	7.3	\$60.00
B 3588	Argentine Brand Pure Old Process Ground Linseed Cake	Jamestown	9.1	34.5	9.4	7.7	
B 3917	Argentine Brand Pure Old Process Ground Linseed Cake	Albion	9.0	35.9	8.7	7.0	65.00
B 4875	Argentine Brand Pure Old Process Ground Linseed Cake	Casnovia	9.1	34.6	7.5	7.5	64.00
		Ludington	9.0	35.2	8.0	7.0	4.25
		Average	9.1	35.0	8.2	7.3	
B 3825	Midland Brand Pure Old Process Ground Linseed Cake	Holland { G.*	32.0	5.0	9.5		
B 3878	Midland Brand Pure Old Process Ground Linseed Cake	Holland { F.*	9.3	33.9	8.1	8.2	61.00
B 4344	Midland Brand Pure Old Process Ground Linseed Cake	Muskegon	9.2	33.4	8.5	7.4	
B 4575	Midland Brand Pure Old Process Ground Linseed Cake	Munising	8.2	36.4	8.0	7.3	3.50
		Charlevoix	8.8	36.9	7.5	8.0	70.00
		Average	8.9	35.2	8.0	7.7	
Minnesota Linseed Oil Co., Minneapolis, Minn.							
B 4347	Old Process Ground Linseed Cake	Marquette { G.*	34.0	5.0	11.0		
		Marquette { F.*	9.1	36.3	6.1	8.5	3.80
Sherwin-Williams Co., Cleveland, Ohio.							
B 4011	SWC Linseed Oil Meal	Coldwater { G.*	33.0	5.0	8.0		
B 3914	SWC Linseed Oil Meal	Sparta { F.*	8.7	35.4	6.0	7.4	3.50
B 4175	SWC Linseed Oil Meal	Hilldale	9.2	37.0	5.8	7.8	
B 4273	SWC Linseed Oil Meal	Battle Creek	9.2	34.9	6.5	7.4	3.75
B 4598	SWC Linseed Oil Meal	Belleville	9.7	36.9	6.1	7.6	68.00
B 4984	SWC Linseed Oil Meal	Jackson	9.7	38.7	6.1	8.4	3.75
		Jackson	9.4	37.4	5.7	8.3	70.00
		Average	9.3	36.7	6.0	7.8	
Toledo Seed & Oil Co., Toledo, Ohio.							
B 3391	Major Brand Old Process Oil Meal	Detroit { G.*	33.0	6.0	10.0		
B 3332	Major Brand Old Process Oil Meal	Detroit { F.*	10.0	34.5	6.4	6.9	60.00
B 3591	Major Brand Old Process Oil Meal	Albion	9.1	33.1	6.1	7.2	62.00
B 3606	Major Brand Old Process Oil Meal	Marshall	9.3	37.8	6.2	7.1	65.00
B 3638	Major Brand Old Process Oil Meal	Detroit	9.8	35.6	6.8	7.4	68.00
B 3940	Major Brand Old Process Oil Meal	Wayland	9.2	36.1	6.1	6.9	
B 3934	Major Brand Old Process Oil Meal	Plainwell	9.8	36.9	6.2	7.4	67.00
B 3941	Major Brand Old Process Oil Meal	Kalamazoo	9.2	36.0	5.5	7.4	65.00
B 4056	Major Brand Old Process Oil Meal	Bay City	9.8	35.1	5.5	6.8	69.00
B 4253	Major Brand Old Process Oil Meal	Grand Rapids	8.9	35.3	6.6	7.1	66.00
		Grand Rapids	9.2	34.8	6.1	8.8	68.00
		Average	9.4	35.5	6.2	7.3	
DISTILLER'S DRIED GRAINS.							
American Milling Co., Peoria, Ill.							
B 3348	Empire Dairy Feed	Detroit { G.*	30.0	10.0	14.0		
		Detroit { F.*	7.4	32.6	8.0	11.2	60.00
YEAST AND VINEGAR GRAINS AND DRIED MALT GRAINS.							
Cleveland Grains Drying Co., Cleveland, Ohio.							
B 4437	Atlantic Grains Yeast & Vinegar Grains	Monroe { G.*	19.0	6.0	18.0		
		Monroe { F.*	5.6	19.1	7.4	18.5	51.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Kellogg Toasted Corn Flake Co., Battle Creek, Mich.						
		(1918) { G.* Coopersville..... { F.*	25.1 8.3	5.1 30.1	12.7 6.1	..... 12.1	..... \$52.00
B 3404	Malt Feed.....	Jamestown.....	8.7	29.8	6.2	11.4	55.00
B 3444	Malt Feed.....	Zeeland.....	8.1	30.7	5.6	9.8	54.00
B 3463	Malt Feed.....	Vriesland.....	9.0	29.5	5.7	11.5	52.00
B 3492	Malt Feed.....	Average.....	8.5	30.0	5.9	11.2	.....
		(1919) { G.* Battle Creek ... { F.*	27.0 4.7	5.2 28.1	12.5 5.8	..... 10.9	..........
B 4267	Malt Feed.....						
	Quaker Oats Co., Chicago, Ill.						
		{ G.* Hudson..... { F.*	18.0 6.9	5.0 18.9	14.0 4.6	..... 11.5	..... 55.00
B 4188	Dried Malt By-Product.....						
	CORN GLUTEN FEED.						
	Corn Products Refining Co., New York City, N. Y.						
		{ G.* Detroit..... { F.*	23.0 9.0	1.0 25.5	8.5 3.0	..... 7.2	..... 63.00
B 3525	Buffalo Corn Gluten Feed.....	Detroit.....	8.9	23.9	3.6	7.3	56.00
B 3630	Buffalo Corn Gluten Feed.....	Lansing.....	7.3	25.8	4.4	8.1	58.00
B 3667	Buffalo Corn Gluten Feed.....	Lansing.....	9.4	26.4	2.6	6.7	3.25
B 3687	Buffalo Corn Gluten Feed.....	Mason.....	10.3	24.4	3.3	6.8	60.00
B 3739	Buffalo Corn Gluten Feed.....	Allegan.....	13.9	24.7	2.6	8.6	65.00
B 3866	Buffalo Corn Gluten Feed.....	Average.....	9.8	25.1	3.3	7.5	.....
	Douglas Company, Cedar Rapids, Ia.						
		{ G.* Ishpeming..... { F.*	23.0 9.5	1.0 23.2	8.0 2.2	..... 6.8	..... 70.00
B 4363	Douglas Corn Gluten Feed.....	Saline.....	8.2	30.7	3.2	6.5	3.75
B 4782	Douglas Corn Gluten Feed.....	Frankfort.....	8.9	22.7	2.5	7.0	3.50
B 4850	Douglas Corn Gluten Feed.....	Average.....	8.9	25.5	2.6	6.8	.....
	J. C. Hubinger Bros. Co., Keokuk, Iowa.						
		{ G.* Grand Rapids... { F.*	23.0 8.4	2.4 22.7	7.5 2.6	..... 7.0	..... 65.00
B 3414	KKK Corn Gluten Feed.....	Muskegon.....	7.9	19.8	6.2	6.8	65.00
B 3893	KKK Corn Gluten Feed.....	Monroe.....	8.0	22.4	7.1	7.2	.....
B 4438	KKK Corn Gluten Feed.....	Ypsilanti.....	8.5	21.8	7.5	6.5	3.20
B 4498	KKK Corn Gluten Feed.....	Average.....	8.2	21.7	5.9	6.9	.....
	Huron Milling Co., Harbor Beach, Mich.						
		{ G.* Bad Axe..... { F.*	22.0 8.6	3.0 21.3	8.0 3.3	..... 6.3	..... 3.00
B 4086	Jenks Corn Gluten Feed.....	Harbor Beach.....	10.6	24.5	5.6	6.0	53.75
B 4125	Jenks Corn Gluten Feed.....	Croswell.....	8.8	17.6	4.2	7.9	3.00
B 4134	Jenks Corn Gluten Feed.....	Alpena.....	8.4	19.3	3.7	5.9	68.00
B 4316	Jenks Corn Gluten Feed.....	Port Huron.....	7.8	20.8	4.8	7.4	3.50
B 4957	Jenks Corn Gluten Feed.....	Average.....	8.8	20.7	4.3	6.7	.....
	HOMINY FEED.						
	American Hominy Co., Indianapolis, Ind.						
		{ G.* Bronson..... { F.*	10.0 9.9	6.0 10.4	6.0 5.9	..... 3.4	..........
B 4737	Homoo Hominy Feed.....						
	Beck Cereal Co., Detroit, Mich.						
		{ G.* Detroit..... { F.*	10.0 14.6	6.0 10.1	6.0 5.9	..... 3.6	..... 60.00
B 3336	Royal Yellow Hominy Feed Meal.....	Detroit.....	11.3	8.9	6.0	3.4	56.00
B 3626	Royal Yellow Hominy Feed Meal.....	Average.....	13.0	9.5	6.0	3.5

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 3455	Badger Hominy Feed.....	Zeeland..... { G.* F.*	10.9	10.7	6.0	5.0	\$65.00
B 3711	Badger Hominy Feed.....	St. Johns.....	9.9	10.5	5.6	2.1	58.00
B 4346	Badger Hominy Feed.....	Marquette.....	9.7	10.9	6.3	4.3	3.35
		Average.....	10.2	10.7	6.1	3.6	.....
Marshall Milling Co., Marshall, Minn.							
B 3869	Hominy Feed.....	Allegan..... { G.* F.*	9.6	10.8	7.5	6.7	60.00
Pestum Cereal Co., Battle Creek, Mich.							
B 4264	Burt's Hominy Feed.....	Battle Creek.... { G.* F.*	9.7	10.6	5.8	3.3	.....
United States Frumentum Co., Detroit, Mich.							
B 3664	Frumentum Hominy Feed.....	Detroit..... { G.* F.*	8.7	10.5	6.0	7.0	53.50
CORN GERM MEAL.							
Corn Products Refining Co., New York City, N. Y.							
B 3639	Diamond Hog Meal.....	Detroit..... { G.* F.*	9.6	18.0	7.0	13.0	.....
B 4193	Diamond Hog Meal.....	Adrian.....	10.9	14.9	10.7	9.8	62.00
B 4299	Diamond Hog Meal.....	Allegan.....	10.6	23.7	10.0	9.4	65.00
B 4558	Diamond Hog Meal.....	Spaulding.....	8.5	22.0	10.0	8.6	60.00
B 4610	Diamond Hog Meal.....	Vriesland.....	7.5	20.1	9.7	8.9	64.00
B 4913	Diamond Hog Meal.....	Plymouth.....	8.1	23.0	8.7	9.0	60.00
		Average.....	9.2	20.6	11.9	9.5	3.00
CORN FEED MEAL.							
Ferdinand Becker, Grand Rapids, Mich.							
B 4644	Feed Corn Meal.....	Grand Rapids... { G.* F.*	11.4	9.0	4.0	9.0	72.00
Durrah Milling Co., Big Rapids, Mich.							
B 4247	Unbolted Corn Meal.....	Big Rapids.... { G.* F.*	15.3	9.0	4.0	3.5	56.00
King Milling Co., Lowell, Mich.							
B 4256	King Corn Meal.....	Lowell..... { G.* F.*	15.9	10.1	7.5	4.8	.....
Saginaw Milling Co., Saginaw, Mich.							
B 4041	Saginaw Corn Feed.....	Saginaw..... { G.* F.*	11.4	10.0	6.0	7.0	.....
B 4132	Saginaw Corn Feed.....	Crowell.....	14.6	11.3	7.3	2.8	2.30
B 4148	Saginaw Corn Feed.....	Mayville.....	11.5	10.1	6.7	3.7	.....
		Average.....	12.5	10.5	5.7	4.6	50.00
David Stott Flour Mills, Detroit, Mich.							
B 4415	Corn Feed Meal.....	Adrian..... { G.* F.*	9.9	10.0	6.0	5.0	60.00
Valley City Milling Co., Grand Rapids, Mich.							
B 3798	Rowena Coarse Corn Meal.....	Hartford..... { G.* F.*	11.0	9.0	5.0	3.5	60.00
B 3863	Rowena Coarse Corn Meal.....	Grand Rapids.....	12.3	11.1	8.8	4.0	48.00
		Average.....	11.7	9.9	7.7	4.4	.....
Washburn Crosby Co., Minneapolis, Minn.							
B 3884	Corn Feed Meal.....	Muskegon..... { G.* F.*	10.2	11.7	8.3	4.2	.....
			10.2	8.0	5.0	10.0	62.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Watson Higgins Milling Co., Grand Rapids, Mich.						
B 3199	Corn Feed.....	(1918) { G.* Grand Rapids..... F.*	10.5 12.4	8.0 9.6	7.0 3.2	3.7	\$53.00
B 3857	Corn Feed.....	Wayland.....	11.9	8.9	3.7	3.1	58.50
B 3910	Corn Feed.....	Grand Rapids.....	11.7	9.0	3.3	4.0	57.00
	ANIMAL BY-PRODUCTS.	Average.....	12.0	9.2	3.4	3.6	
	Chicago Feed & Fertilizer Co., Chicago, Illinois.						
B 4172	Magie Brand Digester Tankage.....	Hillsdale..... { G.* F.*	60.0 7.8	2.0 58.4	3.0 4.2	0.7	6.00
	Darling & Company, Chicago, Illinois.						
B 3992	Darling's 60% Digester Tankage.....	Eaton Rapids..... { G.* F.*	60.0 10.1	0.5 61.9	3.0 5.6	1.7	6.25
B 4740	Darling's Meat Crisps.....	Hillsdale..... { G.* F.*	75.0 6.3	0.5 75.9	3.0 8.1	0.4	
B 3453	Darling's Meat Scraps.....	Zeeland..... { G.* F.*	50.0 9.4	0.5 51.7	3.0 7.6	2.1	5.75
B 3694	Darling's Meat Scraps.....	Lansing.....	9.6	54.1	2.3	2.7	5.75
B 3776	Darling's Meat Scraps.....	South Haven.....	7.4	52.5	9.3	2.6	5.75
B 4010	Darling's Meat Scraps.....	Union City.....	7.6	53.6	9.7	2.5	6.00
B 4012	Darling's Meat Scraps.....	Coldwater.....	7.7	55.1	9.6	2.7	5.50
B 4143	Darling's Meat Scraps.....	Marlette.....	8.7	53.3	9.9	2.7	6.00
B 4252	Darling's Meat Scraps.....	Grand Rapids.....	7.1	55.4	8.4	2.5	5.50
B 4403	Darling's Meat Scraps.....	Tecumseh.....	8.0	52.8	9.6	3.3	
B 4804	Darling's Meat Scraps.....	Petoskey.....	8.6	55.0	7.1	3.0	7.50
B 4813	Darling's Meat Scraps.....	Boyne City.....	7.8	55.1	9.3	2.4	6.20
	Hartman Tankage Works, Grand Rapids, Mich.	Average.....	8.2	53.9	8.3	2.7	
B 3189	Hartman Tankage.....	Comstock Park..... { G.* F.*	49.2 6.7	9.8 50.8	0.8 11.2	0.9	80.00
	A. P. Kleise, Holland, Mich						
B 4642	Tankage.....	Holland..... { G.* F.*	45.0 4.6	10.0 38.3	0.5 16.9	1.0	80.00
	Millenbach Bros. Co., Detroit, Mich.						
B 3364	Millenbach's Mixed Beef Scraps.....	Detroit..... { G.* F.*	45.0 7.8	10.0 48.7		2.5	4.60
B 3398	Millenbach's Mixed Beef Scraps.....	Detroit.....	7.9	56.0	9.8	1.7	4.25
B 3623	Millenbach's Mixed Beef Scraps.....	Detroit.....	7.4	49.5	10.2	3.0	5.00
	Swift & Company, Chicago, Ill.	Average.....	7.7	51.4	9.9	2.4	
B 3586	Swift's Digester Tankage.....	Albion..... { G.* F.*	60.0 8.0	5.0 57.8	3.0 7.7	0.9	5.00
B 3749	Swift's Digester Tankage.....	Perry.....	7.2	63.0	9.9	1.6	65.00
B 4196	Swift's Digester Tankage.....	Adrian.....	8.6	61.8	10.3	1.7	5.75
B 4618	Swift's Digester Tankage.....	Cassopolis.....	11.3	59.7	8.1	1.8	
	Swift's Meat Meal	Average.....	8.8	60.6	9.0	1.5	
B 3695	Swift's Meat Meal.....	Lansing..... { G.* F.*	48.0 12.0	4.0 48.0	3.0 6.6	1.9	5.25
B 4197	Swift's Meat Scraps.....	Adrian..... { G.* F.*	50.0 6.4	6.0 50.6	3.0 11.1	1.6	5.75
B 4933	Swift's Meat Scraps.....	Pontiac.....	7.5	55.3	9.6	2.6	5.50
	Swift's Poultry Bone	Average.....	7.0	53.0	10.4	2.1	
B 3633	Swift's Poultry Bone.....	Detroit..... { G.* F.*	25.0 6.8	2.0 25.2	3.0 2.0	3.6	5.50
	S. I. Treat & Son, Coldwater, Mich.						
B 4734	Old Hoss Brand Tankage.....	Coldwater..... { G.* F.*	53.0 3.7	17.4 47.7	0.7 19.8	2.8	60.00

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
DRIED BEET PULP.							
Larrows Milling Co., Detroit, Mich.							
B 3764	Dried Beet Pulp.....	Howell..... { G. F.	8.0 9.9	0.5 0.9	20.0 18.5		
B 3990	Dried Beet Pulp.....	Grand Rapids.....	10.5	8.8	1.2	18.8	\$52.00
B 4035	Dried Beet Pulp.....	Saginaw.....	10.3	8.8	1.2	19.3	46.00
B 4187	Dried Beet Pulp.....	Hudson.....	7.6	9.2	0.5	19.4	55.00
B 4250	Dried Beet Pulp.....	Grand Rapids.....	9.4	9.1	0.9	18.5	46.00
		Average.....	9.6	8.9	0.9	18.9	
Michigan Sugar Co., Saginaw, Mich.							
B 4015	Dried Beet Pulp.....	Coldwater..... { G. F.	8.0 9.3	0.5 8.3	20.0 17.7		2.60
B 4985	Dried Beet Pulp.....	Jackson.....	9.4	8.9	0.7	18.2	46.00
		Average.....	9.4	8.6	0.8	18.00	
ALFALFA MEAL.							
Denver Alfalfa Milling & Products Co., Lamar, Colorado.							
B 3817	Alfalfa Meal.....	Holland..... { G. F.	12.0 9.5	1.5 16.6	35.0 23.5		56.00
Albert Dickinson Co., Chicago, Ill.							
B 4219	Alfalfa Meal.....	Benton Harbor..... { G. F.	12.0 7.7	1.0 14.1	35.0 32.4		2.75
B 4923	Alfalfa Meal.....	Wixom.....	13.0	13.3	1.3	31.6	47.00
		Average.....	10.4	13.7	1.5	32.0	
Hales & Edwards Co., Chicago, Ill.							
B 4212	Red Comb Alfalfa Meal.....	Niles..... { G. F.	13.5 8.2	1.0 17.6	35.0 24.0		3.25
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 3452	Alfalfa Meal.....	Zeeland..... { G. F.	14.0 9.0	1.0 13.6	30.0 30.3		2.00
Omaha Alfalfa Milling Co., Omaha, Neb.							
B 3777	Alfalfa Meal.....	South Haven..... { G. F.	12.0 8.4	1.0 15.4	30.0 30.4		40.00
B 4029	Alfalfa Meal.....	Saginaw.....	8.8	13.2	1.0	32.3	48.00
		Average.....	8.6	14.3	1.3	31.4	

*Abbreviations for Guaranteed and Found.

EXPERIMENT STATION BULLETIN.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
CALF MEAL.								
American Milling Co., Peoria, Ill.								
B 4385	Sucrose Calf Meal.	Hancock.	{ G* F* } 11.1	80.0 18.9	4.0 4.8	2.0 4.8	\$6.00	Linseed meal, malt flour, bone meal, wheat middlings, blood flour, soluble starch, dried buttermilk, corn meal.
B 4092	Farmer Brand Calf Meal.	Elkton.	{ G* F* } 8.8	80.9 20.9	5.6 3.0	4.0 4.0	5.00	Cottonseed meal, linseed meal, blood meal, cereal food by-products.
B 4165	Bartlett's Calf Meal.	Litchfield.	{ G* F* } 7.8	81.0 21.9	4.0 2.4	4.0 2.9	5.40	Cottonseed meal, linseed meal, dried milk, cooked by-products of corn, barley, wheat.
B 4091	Bartlett's Calf Meal.	Jackson.	8.4	81.6	3.0	4.1	4.20	Same as B 4165 without dried milk.
		Average	8.1	21.8	2.7	3.5		
Blatchford Calf Meal Factory, Waukegan, Ill.								
B 3590	Blatchford's Calf Meal.	Albion.	{ G* F* } 10.3	81.0 25.9	5.0 7.0	6.7 6.3	5.50	Cottonseed meal, blood flour, wheat flour, locust bean meal, unpressed flaxseed, malt sprout barley meal, ground beans and peas, rice powder, linseed meal, dried milk, coconut meal, cocoa shell meal, fenugreek, anise, salt.
B 3351	Blatchford's Calf Meal.	Detroit.	10.2	29.1	5.2	6.9	94.00	Same as B 3590.
B 3602	Blatchford's Calf Meal.	Albion.	10.1	28.2	4.9	7.4	6.50	Same as B 3590.
B 3609	Blatchford's Calf Meal.	Marshall.	12.4	26.9	6.9	7.0	6.00	Same as B 3590.
B 4313	Blatchford's Calf Meal.	Alpena.	10.3	26.7	6.1	7.1	5.10	Same as B 3590.
		Average	10.7	27.4	6.0	6.9		
Dodge Hooker Mills, Wausau, Wis.								
B 4398	Wisconsin Calf Meal.	Ironwood.	{ G* F* } 10.0	86.0 24.9	5.0 5.3	6.0 5.3	5.00	Cottonseed meal, linseed meal, pea meal, wheat flour, blood flour, flaxseed meal, corn germ meal.
Halse & Edwards Co., Chicago, Ill.								
B 3678	Red Horn Calf Meal.	Lansing.	{ G* F* } 11.1	18.0 16.6	5.0 4.0	6.0 2.7	5.25	Alfalfa meal, oat flour, corn flour, barley flour, red dog flour, dried buttermilk, oat meal, dextrose, salt.
B 4679	Red Horn Calf Meal.	Ludington.	10.6	18.2	4.6	3.5	5.25	Same as B 3678 with calcium carbonate.
		Average	10.9	17.4	4.3	3.1		
International Sugar Feed Co., Minneapolis, Minn.								
B 4904	International Calf Meal.	Ironwood.	{ G* F* } 10.1	86.0 26.0	5.0 6.5	6.0 9.0		Linseed meal, locust bean meal, red dog flour, ground screenings, fenugreek.

B 3889	Chas. A. Krause Milling Co., Milwaukee, Wis.	Muskegon.....	{ G* F* }	9.8 10.4	80.0 31.9 30.0	5.5 5.0 3.7	7.0 4.5 5.3	Lined meal, hominy feed, wheat bran and middlings, blood flour, red dog flour. Same as B 3889 without bran.
B 4078		Average.....		10.1	31.0	4.4	4.9	
B 4718	Lamprey Products Co., St. Paul, Minn.	Royal Oak.....	{ G* F* }	9.2	26.0 19.7	5.0 4.9	10.0 5.5	Cottonseed meal, lined meal, gluten meal, leust bean meal, blood meal, oat meal, corn meal, rye middlings, fenu-greek, salt.
B 3974	J. C. Martin Co., Mineral Point, Wis.	Exert.....	{ G* F* }	8.6	25.6	5.9	6.0	Cottonseed meal, lined meal, coconut meal, blood meal, (trace) wheat flour, germ middlings, corn meal, oat meal, peanut oil, fenu-greek, charcoal, (trace), salt.
B 4120		Deleville.....		10.6	24.7	6.3	6.1	Lined meal, blood meal, wheat flour, wheat middlings, germ middlings, flaxseed, peanut oil meal, corn meal, oat meal, fenu-greek, meal, salt.
B 4223		Benton Harbor.....		9.2	23.2	5.8	7.5	Same as B 4120 without blood meal.
B 4522		Excelsior.....		10.5	22.6	5.9	6.00	Same as B 4120 with cottonseed meal.
B 4544		Daggett.....		9.1	23.8	5.7	6.25	Same as B 4522.
B 4532	National Food Co., Fond Du Lac, Wis.	Average.....		9.6	24.0	5.8	6.6	Lined meal, middlings, fenu-greek, anise, charcoal, salt.
B 4548		Bark River.....	{ G* F* }	9.9 10.3	17.9 19.6	5.0 6.0 5.7	6.0 5.75 6.10	Same as B 4532.
B 4123	Purina Mills Co., St. Louis, Mo.	Average.....		10.1	20.8	5.9	5.6	Lined meal, hominy feed, blood meal, wheat flour.
B 4136		Harbor Beach.....	{ G* F* }	11.2 11.1	32.5 32.8	3.5 3.2	5.75 5.00	Same as B 4123.
B 4097		Cornwall.....		10.8	32.8	3.8	3.6	Cottonseed meal, hominy feed, blood meal, wheat flour.
B 3758	Quaker Oats Co., Chicago, Ill.	Average.....		11.0	32.7	3.4	3.6	Wheat meal, oat meal, ground flaxseed, milk albumen, lined meal, bicarbonate of soda.
B 3948		Howell.....	{ G* F* }	9.2	18.1	5.8	2.4	Same as B 3758 with blood meal.
B 4078		Sparta.....		9.7	18.3	5.8	2.6	Same as B 3948.
B 3603	Ryde & Company, Chicago, Ill.	Average.....		9.1	18.3	6.6	2.4	Cottonseed meal, hominy feed, blood flour, wheat flour, ground flaxseed, leust bean meal, beans and peas, cocoa shell meal, fenu-greek, anise, salt.
B 3720		Albion.....	{ G* F* }	11.3	25.0 24.6	6.0 6.2	6.0 6.6	Same as B 3603 with corn.
B 3832		Orosco.....		10.1	25.7	4.6	6.9	Same as B 3603.
B 3912		Detroit.....		10.2	25.4	4.6	7.4	Same as B 3832.
B 3912		Grand Rapids.....		9.8	24.4	5.6	6.9	Same as B 3912.
B 3984		Mulliken.....		11.9	24.5	6.0	7.9	Same as B 3903.

Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fibre.	Price per ton or cwt.	Principal ingredients identified.
	Ryde & Co., Chicago, Ill.—Con.							
B 4050	Ryde's Cream Calf Meal.	Saginaw	9.4	25.0	6.1	7.8	\$5.00	Same as B 3603.
B 4063	Ryde's Cream Calf Meal.	Bay City	9.1	24.5	5.7	7.1	5.00	Same as B 3603.
B 4853	Ryde's Cream Calf Meal.	Elberta	10.3	23.3	5.9	9.6	5.50	Same as B 3603.
	Security Food Co., Minneapolis, Minn.	Average	10.3	24.7	5.6	7.5		
B 3922	Security Food Compound	Middleton { G.* F.*	9.8	9.8	4.5	6.0		Locust bean meal, dried milk, wheat flour, wheat middlings, corn starch, oxide of iron, sugar, capsaum, fenugreek, anise.
B 4170	Security Food Compound	Litchfield	9.9	15.0	5.0	6.7	20.00	Wheat flour, wheat middlings, corn starch, sugar, ginger, iron oxide, fenugreek, anise.
	E. L. Wellman, Grand Rapids, Mich.	Average	10.2	14.9	4.7	6.4		
B 3977	Wellman's Qualified Calf Meal.	Conklin { G.* F.*	18.0	18.0	8.0	4.0	4.50	Lineed meal, ground flaxseed, wheat meal, oat meal, corn feed meal, milk albumen, bicarbonate of soda.
	HOG FEEDS.							
	Amendt Milling Co., Monroe, Mich.							
B 4436	Amco Hog Feed	Monroe { G.* F.*	16.0	16.0	4.5	8.0		Lineed meal, gluten feed, clipped oat by-product, tankage, corn feed meal, barley, dried milk.
B 4730	Amco Hog Feed	Trenton	9.8	16.9	4.2	6.0	2.90	Same as B 4436 with wheat middlings.
	American Milling Co., Peoria, Ill.	Average	9.2	17.8	4.4	6.1	3.50	
B 3347	Sucrene Hog Meal	Detroit { G.* F.*	18.0	18.0	4.0	14.0		Lineed meal, gluten feed, distillers' grains, blood flour, alfalfa meal, corn, corn feed meal, palm kernel meal, molasses, salt.
B 4356	Sucrene Hog Meal	Negaunee	11.3	19.0	5.0	7.4	4.00	Lineed meal, alfalfa meal, blood flour, palm kernel meal, corn germ meal, corn feed meal, peanut oil meal, molasses, salt.
	J. E. Bartlett Co., Jackson, Mich.	Average	11.3	20.4	4.6	8.0		
B 4993	Dairy Hog Feed	Jackson { G.* F.*	18.0	18.0	4.0	12.0	2.50	Cottonseed meal, lineed meal, wheat (trace), tankage, corn screenings, rye (trace), cooked by-products of corn and barley.
B 4199	Blackford Calf Meal Factory, Waukegan, Ill.	Adrian { G.* F.*	18.0	18.0	5.0	7.0		Cottonseed meal, lineed meal, malt sprouts meal, beans, peas, flaxseed, rice polish, blood meal, wheat flour, locust bean meal, oat meal, corn meal, barley sprouts meal, anise, salt.
B 4320	Blackford's Pig Meal	Cheboygan	10.0	19.5	4.8	6.9	4.75	Same as B 4199 without malt sprouts meal, beans, and peas.
B 4837	Blackford's Pig Meal	Traverse City	9.8	23.5	5.9	6.4	96.00	Same as B 4199.
	Average		9.9	21.7	5.5	6.6		

The C. E. DePuy Co., Pontiac, Mich.

B 4751	Hog Feed.....	Pontiac.....	{ G. F. }	13.6 12.1	3.7 3.7	7.0 6.3	Linseed meal, wheat middlings, oats, corn, barley.
Albert Dickinson Co., Chicago, Ill.							
B 4388	Queen Hog Fattening Ration.....	Ontonagon.....	{ G. F. }	13.5 10.5	5.0 16.9	12.5 7.8	Linseed meal, pea meal, alfalfa meal, wheat middlings, corn feed meal, ground corn bran, barley feed, tankage, ground screenings.
B 4502	Queen Hog Fattening Ration.....	Iron River.....	{ G. F. }	10.7 10.5	4.9 17.2	7.0 62.00	Same as B 4388 with salt.
B 3359	Rival Hog Feed.....	Average.....	{ G. F. }	10.6 12.5	5.0 5.0	7.4 12.5	Linseed meal, corn feed meal, kafir, ground corn bran, alfalfa meal, ground wheat and barley screenings.
B 3500	Rival Hog Feed.....	Detroit.....	{ G. F. }	11.2 11.4	4.3 9.5	57.00 57.00	Linseed meal, alfalfa meal, corn feed meal, ground corn bran, ground screenings from wheat, oats, barley, and kafir, salt.
B 3598	Rival Hog feed.....	Holland.....	{ G. F. }	11.4 14.8	4.4 3.8	8.4 11.4	Same as B 3500.
B 3939	Rival Hog Feed.....	Albion.....	{ G. F. }	10.2 14.1	3.8 10.0	60.00 52.00	Same as B 3500 without salt.
B 4220	Rival Hog Feed.....	Otego.....	{ G. F. }	9.7 13.0	3.7 9.0	60.00 3.00	Same as B 3500.
B 4807	Rival Hog Feed.....	Benton Harbor.....	{ G. F. }	10.6 14.2	3.7 4.4	9.9 3.00	Same as B 3500.
Dodge Hooker Mills, Wausau, Wis.							
B 4521	Wisconsin Pig Ration.....	Petoakey.....	{ G. F. }	9.8 16.4	4.4 4.1	9.7 10.0	Linseed meal, hominy meal, wheat middlings, rye middlings.
Average.....							
Escanaba.....							
{ G. F. }							
15.0 11.0							
16.8 6.5							
3.40							
The C. E. DePuy Co., Pontiac, Mich.							
B 3362	Common Sense Hog Feed.....	Detroit (1918).....	{ G. F. }	17.0 10.0	9.9 14.9	14.8 10.2	Cottonseed meal, linseed meal, wheat middlings, pea meal, peanut bran, corn products, oat product.
B 4904	Common Sense Hog Feed.....	Wayne (1919).....	{ G. F. }	18.0 10.7	5.6 13.3	10.0 9.7	Same as B 3362.
Hales & Edwards Co., Chicago, Ill.							
B 3470	Pioneer Hog Feed with dried buttermilk.....	Zealand (1918).....	{ G. F. }	12.0 11.6	5.0 14.5	12.0 5.3	Linseed meal, wheat middlings, corn feed meal, ground wheat, barley and kafir screenings, dried buttermilk.
B 3476	Pioneer Hog Feed with dried buttermilk.....	Comstock Park.....	{ G. F. }	11.5 13.5	4.4 6.1	6.1 63.50	Same as B 3470.
B 3488	Pioneer Hog Feed with dried buttermilk.....	Forest Grove.....	{ G. F. }	11.7 14.4	3.8 6.8	6.1 74.00	Same as B 3470.
B 3652	Pioneer Hog Feed with dried buttermilk.....	Lansing.....	{ G. F. }	11.6 12.8	4.2 5.8	3.50 68.00	Same as B 3470.
B 3807	Pioneer Hog Feed with dried buttermilk.....	Holland.....	{ G. F. }	11.4 12.6	4.1 4.8	5.4 75.00	Same as B 3470 with oat hulls.
B 3857	Pioneer Hog Feed with dried buttermilk.....	Edmore.....	{ G. F. }	10.8 13.6	4.8 5.4	4.8 69.00	Same as B 3470.
B 3869	Pioneer Hog Feed with dried buttermilk.....	Grand Rapids.....	{ G. F. }	12.5 13.1	4.3 4.8	6.5 3.40	Same as B 3470.
B 4217	Pioneer Hog Feed with dried buttermilk.....	St. Joseph.....	{ G. F. }	11.0 12.6	4.6 4.5	4.8 3.40	Same as B 3470.
B 4586	Pioneer Hog Feed with dried buttermilk.....	Charlevoix.....	{ G. F. }	10.6 12.8	4.5 4.8	4.8 3.40	Same as B 3470.
Average.....							
11.3 13.3							
4.4 5.8							

*Abbreviations for Guaranteed and Found.
†The brand listed below was licensed by the Farnabella Co., whose business has been taken over by this company.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 4391	International Sugar Feed Co., Minneapolis, Minn.							
B 4391	International Climax Hog Feed	Even..... { G* 10.9 { F* 5.4	15.0 14.8	5.0 5.4	10.0 8.9	3.10		Linseed meal, coconut meal, alfalfa meal, wheat middlings, ground screenings, molasses, salt.
B 3183	International Hog Feed	Grand Rapids..... { G* 10.3 { F* 5.8	15.0 14.8	5.0 5.4	10.0 8.9			Linseed meal, tankage, ground middlings, molasses, charcoal, salt.
B 3592	International Hog Feed	Albion..... { G* 9.6 { F* 5.3	20.5 20.5	5.3 5.3	14.1	60.00		Same as B 3193.
	Average.....		10.0	20.9	5.6	14.0		
B 4171	Interstate Feed Association, Toledo, Ohio.							
B 4171	Superior Hog Feed	Litchfield..... { G* 10.4 { F* 5.6	15.0 16.1	5.6 5.6	18.6 18.2	2.83		Cottonseed hulls, linseed meal, tankage, corn, ground screenings, molasses, charcoal, salt.
B 3961	Ithaca Roller Mills, Ithaca, Mich.							
B 3961	Renown Hog Feed	Ithaca..... { G* 11.1 { F* 2.6	11.1 11.1	2.0 2.6	3.5 4.0			Wheat, wheat bran and middlings, oat meal mill by-product, corn feed meal, barley.
	Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 3423	Badger Hog Feed	Grand Haven..... { G* 15.0 { F* 4.7	15.0 17.3	4.7 4.8	7.5 4.3	3.25		Linseed meal, gluten feed, hominy feed, tankage, corn feed meal, corn germ meal, corn red dog flour, salt.
B 3772	Badger Hog Feed	South Haven..... { G* 16.6 { F* 4.4	16.6 16.6	4.4 4.4	5.3 5.3	45.00		Same as B 3423 with wheat middlings.
B 3957	Badger Hog Feed	Madison..... { G* 18.6 { F* 4.2	18.6 18.6	4.2 4.2	5.2 5.2	85.00		Same as B 3423 without gluten feed.
B 3958	Badger Hog Feed	Edmore..... { G* 16.4 { F* 4.5	16.4 16.4	4.5 4.5	4.3 4.3	68.00		Same as B 3423.
B 4304	Badger Hog Feed	Gluchon..... { G* 13.5 { F* 4.8	13.5 13.5	4.8 4.8	4.5 4.5	84.00		Same as B 3772.
B 4552	Badger Hog Feed	Menominee..... { G* 17.4 { F* 5.4	17.4 17.4	5.4 5.4	6.3 6.3	3.60		Same as B 3772.
	Average.....		10.0	16.7	4.9	5.1		
B 3457	Krause Hog Feed	Forest Grove..... { G* 15.0 { F* 4.0	15.0 16.9	4.0 4.1	9.0 9.5	70.00		Hominy feed, alfalfa meal, wheat bran and middlings, rye middlings, corn germ meal, corn feed meal, peanut oil meal, tankage, salt.
B 4154	Krause Hog Feed	Vassar..... { G* 10.8 { F* 4.0	10.8 14.0	5.0 5.0	6.7 6.7	2.80		Same as B 3457 without bran and with velvet bean feed.
B 4097	Krause Hog Feed	Cass City..... { G* 12.2 { F* 6.2	12.2 18.9	6.2 6.2	7.5 7.5	70.00		Same as B 3457 with velvet bean feed.
B 4490	Krause Hog Feed	Yankton..... { G* 10.2 { F* 5.0	10.2 16.7	5.0 5.0	7.0 7.0	3.00		Same as B 4097.
B 4559	Krause Hog Feed	Spaulding..... { G* 9.7 { F* 4.4	9.7 17.9	4.4 4.4	10.7 10.7	62.00		Same as B 4097.
	Average.....		10.4	16.9	4.9	8.3		
B 4716	Park & Pollard Co., Chicago, Illinois.							
B 4716	Go-to-it Hog Ration	Royal Oak..... { G* 15.0 { F* 8.0	15.0 15.2	8.0 8.0	13.0 9.5	3.50		Linseed meal, hominy feed, coconut meal, fish, bone meal, blood meal, alfalfa meal, wheat middlings, peanut oil feed, rice bran, oat meal mill by-product, corn meal, corn germ meal, salt calcium carbonate.

Purina Mills Co., St. Louis, Mo.		(1918) { G.* Grand Rapids... { F.* Crowell.....		14.0 15.6 10.8 10.1	3.8 3.3 3.3 3.3	9.0 10.0 10.0 11.0	64.00 3.30	Alfalfa meal, corn feed meal, tankage, post, molasses. Alfalfa meal, ground wheat, tankage, corn, molasses, charcoal, salt.
B 3447 B 4139	Purina Pig Chow Purina Pig Chow	Average.....		10.5 15.5	3.4 10.5	.....	.....	Alfalfa meal, tankage, corn feed meal, molasses, salt, post.
B 4486	Purina Pig Chow	(1919) { G.* Laingsburg..... { F.*		14.0 13.4	5.5 3.4	9.0 11.3	3.25	Alfalfa meal, tankage, corn feed meal, molasses, salt, post.
B 4903	Ryde & Co., Chicago, Ill. Ryde's Pig Meal	{ G.* Wayne..... { F.*		21.0 20.2	6.0 6.7	6.0 6.1	5.00	Cottonseed meal, boust bean meal, flaxseed, beans, coarseshell meal, meat scraps, blood meal, wheat middlings, oat meal, corn meal, fenugreek, anise, salt.
B 3108 B 3478 B 3590 B 3919	Watson Higgins Milling Co., Grand Rapids, Mich. Hog Feed Hog Feed Hog Feed Hog Feed	{ G.* Grand Rapids... { F.* Carnstock Park... Sparks..... Kent City.....		7.1 12.4 11.9 9.9 11.1	1.3 3.4 2.0 2.3 3.9	6.4 3.5 4.3 7.9 5.0	..... 42.00 53.00	Wheat, oats, rye, kafir, barley, corn feed meal. Oats, barley, buckwheat, corn feed meal, wheat screenings. Same as B 3478 without barley. Wheat, oats, buckwheat, rye, corn feed meal.
B 3170	E. L. Wellman, Grand Rapids, Mich. Qualified Hog Feed	{ G.* Grand Rapids... { F.*		10.0 9.1	5.8 3.8	10.0 11.2	.....	Cottonseed meal, linseed meal, hominy feed, yellow hominy feed, ground corn, ground barley, wheat middlings, oat meal mill by-product, ground puffed rice and wheat, calcium phosphate salt.
B 3705 B 3771 B 3911	Qualified Hog Feed Qualified Hog Feed Qualified Hog Feed	St. Johns..... South Haven..... Grand Rapids.....		10.0 9.3 9.3	15.1 10.1 10.1	3.6 4.1 3.8	7.4 9.6 10.1	Linseed meal, gluten feed, yellow hominy feed, oat meal mill by-product, rye middlings, barley, calcium phosphate, salt. Same as B 3170. Same as B 3170.
B 4494	DAIRY AND STOCK FEEDS. Amendt Milling Co., Monroes, Mich. Amco Dairy Feed	{ G.* Ypsilanti..... { F.*		22.0 9.1	6.0 5.7	13.0 12.5	3.00	Cottonseed meal, linseed meal, gluten feed, brewers grains, wheat bran and middlings, oat feed, barley.
B 3401 B 3767 B 4176 B 4911	Armour Grain Co., Chicago, Ill. Armour Dairy Feed Armour Dairy Feed Armour Dairy Feed Armour Dairy Feed	{ G.* Grand Rapids... { F.* South Haven..... Wayne..... Hilledale.....		22.0 9.7 8.9 8.5 8.2	5.0 4.9 5.0 4.7 5.3	14.0 14.0 15.9 14.5 13.0	62.00 62.00 60.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran, oat meal mill by-product, corn oil meal, coconut oil meal, salt. Same as B 3401. Same as B 3401. Same as B 3401.
	Average.....	8.8 22.9		5.0 14.4	.....	.....	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 4238	Armour Grain Co., Chicago, Ill.—Con.							
B 4238	Armour's Stock Feed.	Paw Paw..... { G. F. }	9.0	18.0 13.3	4.0 4.4	18.0 11.7	\$65.00	Cottonseed meal, hominy feed, wheat middlings, oat meal mill by-product, ground corn, ground barley, corn oil meal, salt.
B 3959	Badenoch's Stock Feed.	Edmore..... { G. F. }	9.9	8.0 8.0	8.0 2.6	12.0 9.8	60.00	Hominy feed, oat meal mill by-product, corn feed meal, salt.
B 4508	Cemco Ready Ration Dairy Feed.	Vulcan..... { G. F. }	13.1	18.9 19.8	5.2 5.6	8.6 8.4	2.75	Cottonseed meal, linseed meal, hominy meal, brewers' grains, wheat bran and middlings, salt.
B 4545	Cemco Ready Ration Dairy Feed.	Daggett..... { G. F. }	9.4	19.8 19.4	5.6 5.4	8.4 8.5	3.50	Same as B 4508 with gluten feed and malt sprouts.
B 3179	Chapin & Company, Chicago, Ill.	Average..... { G. F. }	11.3	21.0 20.3	4.0 3.7	12.0 11.0	60.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, copra meal, oat meal mill by-product, corn germ meal, salt.
B 3802	Triangle Dairy Feed	Hudsonville..... { G. F. }	7.2	23.6 22.8	5.7 5.5	7.4 11.2	62.00	Same as B 3179.
B 3871	Triangle Dairy Feed	Zealand..... { G. F. }	9.4	22.8 21.9	5.5 4.9	11.2 11.5	59.00	Same as B 3179.
B 3866	Triangle Dairy Feed	Allegan..... { G. F. }	7.9	21.9 22.8	4.9 5.4	11.5 12.2	61.00	Same as B 3179.
B 4551	Triangle Dairy Feed	Menominee..... { G. F. }	8.3	22.3 22.3	5.4 5.4	10.7 10.7	62.00	Same as B 3179.
B 3180	Union Dairy Ration.	Average..... { G. F. }	8.3	22.3 26.3	5.4 6.7	10.7 8.6	68.00	Cottonseed meal, linseed meal, gluten feed, hominy meal, brewers' grains, corn chaffers, grain, copra meal, corn starch by-product, corn wheat bran, barley feed, salt.
B 3688	Union Dairy Ration.	Hudsonville..... { G. F. }	8.2	26.3 26.3	6.7 6.7	8.6 8.6	68.00	Same as B 3180.
B 3801	Union Dairy Ration.	Lansing..... { G. F. }	8.9	26.7 27.0	7.0 9.1	9.0 9.6	3.50	Same as B 3180.
B 3856	Union Dairy Ration.	Zealand..... { G. F. }	9.1	27.0 26.0	9.6 5.7	9.6 10.4	67.00	Same as B 3180.
B 3873	Union Dairy Ration.	Moline..... { G. F. }	9.1	26.0 25.8	5.7 9.5	9.6 9.5	65.00	Same as B 3180.
B 3966	Union Dairy Ration.	Allegan..... { G. F. }	8.9	25.8 25.8	9.5 9.4	9.5 9.4	63.00	Same as B 3180.
B 4362	Union Dairy Ration.	Lake Odessa..... { G. F. }	9.7	25.8 25.3	9.4 5.9	9.4 9.5	68.00	Same as B 3180.
B 4362	Union Dairy Ration.	Lansing..... { G. F. }	8.3	25.3 26.0	5.9 6.2	9.4 9.5	72.00	Same as B 3180.
B 3439	Dickinson Dairy Feed	Average..... { G. F. }	8.9	26.0 23.9	6.2 5.5	9.5 11.0	60.00	Cottonseed meal, linseed meal, gluten feed, brewers' grains, wheat bran and middlings, salt.
B 3803	Dickinson Dairy Feed	Holland..... { G. F. }	9.9	23.9 23.6	5.5 5.0	11.0 10.5	60.00	Same as B 3439 with hominy feed.
B 3979	Dickinson Dairy Feed	Marquette..... { G. F. }	10.1	23.6 24.3	5.0 5.7	10.5 9.1	66.00	Same as B 3803.
B 4448	Dickinson Dairy Feed	Grand Lodge..... { G. F. }	10.0	24.3 26.1	5.7 6.5	9.1 8.9	64.00	Same as B 3803.
B 4748	Dickinson Dairy Feed	Hilldale..... { G. F. }	9.1	26.1 26.1	6.5 5.2	8.9 9.5	66.00	Same as B 3803.
B 4817	Dickinson Dairy Feed	Mannies..... { G. F. }	10.4	26.1 24.3	5.2 5.1	9.5 8.7	3.25	Same as B 3803.
B 4880	Dickinson Dairy Feed	Ludington..... { G. F. }	10.0	24.3 24.3	5.1 5.1	9.5 9.5	3.50	Same as B 3803.

B 4896	Dickinson Dairy Feed	Belleville.....	9.6	24.3	5.1	9.6	3.25	Same as B 3803.
		Average.....	9.8	24.2	5.4	9.5	.....
B 4328	Queen Dairy Feed	Sault Ste. Marie.....	.....	80.0	4.0	10.0	.....	Cottonseed meal, linseed meal, gluten feed, malt sprouts, wheat bran and middlings, corn feed meal, salt.
B 4314	Queen Dairy Feed	Esanaba.....	9.4	21.5	5.5	10.1	72.00	Same as B 4328 without gluten feed.
		.....	10.6	20.2	4.9	10.4	66.00	
		Average.....	10.0	20.9	5.2	10.3	.....
B 3868	White Cross Stock Feed	Allegan.....	.....	10.0	3.5	10.0	.....	Cottonseed meal, wheat middlings, ground oats, ground corn, ground barley, salt.
B 4006	White Cross Stock Feed	Crystal Falls.....	10.8	10.5	4.1	5.9	67.00	Cottonseed meal, wheat meal, ground oats, corn feed meal, ground corn bran, ground barley, salt.
		.....	11.1	15.4	4.4	6.4	3.25	
		Average.....	11.0	13.0	4.3	6.2	.....
B 3870	Polo Dairy Feed	Clare.....	.....	17.5	3.5	16.0	.....	Cottonseed meal, brewers' grains, corn feed meal, clipped oat by-product, ground flaxseed screenings.
		.....	8.3	16.3	6.1	17.7	53.00	
B 4399	Wisconsin Balanced Ration	Ironwood.....	.....	18.0	5.0	11.0	.....	Cottonseed meal, linseed meal, hominy meal, malt sprouts, wheat bran and middlings, barley feed, salt.
B 4322	Wisconsin Balanced Ration	Esanaba.....	10.3	19.0	5.1	9.4	3.10	Same as B 4399 with gluten feed and brewers grains.
		.....	10.4	18.5	5.0	9.4	3.50	
		Average.....	10.4	18.8	5.1	9.4	.....
B 3361	Common Sense Dairy Feed	Detroit.....	.....	15.5	5.5	12.5	.....	Cottonseed meal, wheat bran, peanut bran, corn products, oat products.
B 4942	Common Sense Dairy Feed	Birmingham.....	10.7	13.8	5.9	12.3	52.00	Cottonseed meal, alfalfa, wheat bran and middlings, peanut meal, corn feed meal, oat by-products.
		.....	10.1	13.3	6.0	11.1	3.00	
B 3411	Estall Dairy Feed	Grand Rapids.....	.....	20.0	4.0	10.0	.....	Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers' grains, malt sprouts, wheat bran, corn feed meal, ground oats, ground barley.
B 3691	Estall Dairy Feed	Lansing.....	10.3	20.7	5.2	9.0	3.25	Cottonseed meal, linseed meal, gluten feed, alfalfa meal, corn feed meal, ground oats, ground barley, dried buttermilk.
		Average.....	10.2	21.5	4.7	9.1	.....
B 3889	Pioneer Stock Feed	Lansing.....	.....	10.0	3.5	9.0	.....	Hominy feed, wheat bran and middlings, oats, oat meal mill by-product, corn feed meal, barley feed.
B 4571	Pioneer Stock Feed	Charlevoix.....	11.5	12.3	3.7	5.9	3.25	Gluten feed, wheat bran and middlings, oat meal mill by-products, corn feed meal, barley feed.
		.....	9.5	16.2	3.2	9.6	3.25	
		Average.....	10.5	14.3	3.5	7.8	.....
B 3459	Red Horn Dairy Feed	Zeland.....	.....	25.0	4.0	15.0	.....	Cottonseed meal, linseed meal, glutted feed, brewers' grains, malt sprouts, wheat bran, corn feed meal.
B 3472	Red Horn Dairy Feed	Grand Rapids.....	10.4	24.6	4.4	9.2	65.00	Same as B 3459.
B 3533	Red Horn Dairy Feed	Detroit.....	11.0	23.2	4.5	10.2	65.00	Same as B 3459.
		9.0	21.3	4.5	11.2	60.00	Same as B 3459.

*Abbreviations for Guaranteed and found.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Hales & Edwards Co., Chicago, Ill.—Con.								
B 3808	Red Horn Dairy Feed.	Holland.	9.5	23.0	4.8	11.0	\$68.00	Same as B 3459.
B 4583	Red Horn Dairy Feed.	Charlevoix.	9.4	22.7	4.9	11.0	3.50	Same as B 3459.
		Average.	9.9	23.0	4.6	10.5		
B 3834	Red Horn Dairy Feed.	(1919) { Detroit { F.*	9.5	22.0	4.7	9.0	66.00	Cottonseed meal, linseed meal, corn gluten feed, alfalfa meal, wheat bran, ground oats, ground barley, corn feed meal, dried butter-milk.
B 3988	Red Horn Dairy Feed.	Grand Rapids.	11.7	17.9	4.2	7.3	68.00	Same as B 3834.
		Average.	10.6	20.0	4.5	7.6		
Ithaca Roller Mills, Ithaca, Mich.								
B 3761	Renown Dairy Feed.	Howell.	11.4	15.0	3.0	9.0	54.00	Cottonseed meal, wheat bran, ground corn, corn bran, barley, wheat screenings, salt.
B 3960	Renown Dairy Feed.	Ithaca.	9.8	12.2	3.0	6.6	52.00	Same as B 3761.
		Average.	10.6	12.0	3.0	7.0		
Chas. A. Krause Milling Co., Milwaukee, Wis.								
B 3181	Badger Stock Feed.	Coopersville.	8.4	10.0	4.6	18.0	55.00	Hominy feed, corn, corn germ meal, corn red dog flour, oat meal mill by-product, wheat bran and middlings.
B 3709	Badger Stock Feed.	St. Johns.	9.5	10.8	3.9	12.0	52.50	Same as B 3181 with linseed meal.
B 3953	Badger Stock Feed.	Greenville.	8.7	11.1	4.0	12.6	58.00	Same as B 3181.
B 4402	Badger Stock Feed.	Tecumseh.	9.2	10.5	4.2	14.7	3.25	Same as B 3181, without corn germ meal, with screenings.
B 4547	Badger Stock Feed.	Daggett.	8.7	9.5	4.1	15.3	2.65	Same as B 3181 without corn.
B 4843	Badger Stock Feed.	Traverse City.	8.1	10.7	3.8	14.3	3.00	Same as B 3709.
B 4978	Badger Stock Feed.	Mt. Clemens.	8.8	12.3	4.3	11.6		Same as B 3181 with cottonseed meal.
		Average.	8.8	10.7	3.9	13.5		
B 3405	Cream City Dairy Feed.	(1918) { Coopersville { F.*	9.3	19.0	3.6	16.0	55.00	Cottonseed meal, linseed meal, gluten feed, brewers' grains, wheat bran, oat meal mill by-product, velvet bean feed, salt.
B 3434	Cream City Dairy Feed.	Grand Haven.	9.5	19.6	4.9	13.6	3.00	Same as B 3405 with wheat and rye middlings.
B 3440	Cream City Dairy Feed.	Janesville.	9.8	19.6	3.8	13.1	52.00	Same as B 3405 with wheat middlings, without linseed meal.
B 3456	Cream City Dairy Feed.	Zeeeland.	9.6	19.6	4.5	13.3	59.00	Same as B 3405 without velvet bean feed.
B 3482	Cream City Dairy Feed.	Forest Grove.	9.6	19.9	3.7	12.8	56.00	Same as B 3434.
B 3938	Cream City Dairy Feed.	Owago.	8.4	17.1	3.6	17.6	60.00	Same as B 3405 without velvet bean feed.
B 4087	Cream City Dairy Feed.	Bad Axe.	9.7	19.4	5.4	13.0	64.00	Same as B 3938.
B 4116	Cream City Dairy Feed.	Decker.	9.1	20.2	6.2	13.1	2.75	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran and middlings, rye middlings, oat meal mill by-product, screenings, salt.

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B 4842	Cream City Dairy Feed.....	Traverse City.....	9.0	21.4	4.5	15.2	3.00	Same as B 3434 without velvet bean feed.
	Average.....		8.2	19.8	4.5	13.6		
B 4801	Cream City Dairy Feed.....	(1919) { G* F* } Potoskey.....	19.0 22.6 8.6	4.5 5.2 12.7	15.0 15.0 15.0	2.53	Same as B 3403. Cottonseed meal, linseed meal, gluten feed, hominy feed, distillers' grains, brewers' grains, corn germ meal, wheat bran and middlings, rye middlings, salt.	
B 3178	Krause Dairy Feed.....	{ G* F* } Hudsonville.....	24.0 24.3 8.2	5.6 5.6 10.6	60.00	65.00	Cottonseed meal, linseed meal, gluten feed, brewers' grains, malt sprouts, distillers' grains, wheat bran and middlings, rye middlings, oat shorts, corn germ meal, salt.	
B 3458	Krause Dairy Feed.....	Zeeland.....	9.8	24.8	4.7	10.8	Same as B 3458 without rye middlings and oat shorts, with corn. Same as B 3710 with hominy feed. Same as B 3717 without corn and corn. Same as B 3717 without corn and corn. Same as B 3456 with rye middlings. Same as B 3456 with hominy feed. Same as B 4118, without brewers' grains. Same as B 4089. Same as B 4089.	
B 3486	Krause Dairy Feed.....	Forest Grove.....	9.1	24.8	5.2	10.4	62.50	
B 3710	Krause Dairy Feed.....	St. Johns.....	8.3	23.9	6.4	12.8	66.50	
B 3717	Krause Dairy Feed.....	Orosco.....	8.6	25.4	5.4	11.1	3.35	
B 3830	Krause Dairy Feed.....	Holland.....	8.9	25.3	5.9	10.7	68.00	
B 3897	Krause Dairy Feed.....	Nashville.....	9.3	25.1	5.9	10.0	65.00	
B 4059	Krause Dairy Feed.....	Bad Axe.....	8.3	23.8	6.9	12.4	66.00	
B 4118	Krause Dairy Feed.....	DeKerville.....	9.4	23.8	6.3	11.4	3.25	
B 4204	Krause Dairy Feed.....	Fremont.....	9.1	23.6	5.8	11.0	63.00	
B 4251	Krause Dairy Feed.....	Grand Rapids.....	8.9	23.5	4.6	11.8	66.00	
B 4360	Krause Dairy Feed.....	Spaulding.....	8.4	24.3	5.2	10.5	61.00	
B 4802	Krause Dairy Feed.....	Potoskey.....	8.2	26.1	5.7	10.4	3.25	
	Average.....		8.8	24.4	5.7	11.1		
B 3457	Krause Stock Feed.....	{ G* F* } Zeeland.....	10.0 10.2 9.1	4.8 4.8 10.8	18.0	59.00	Hominy feed, corn red dog flour, oat meal mill by-products, salt.	
B 3459	Krause Stock Feed.....	Forest Grove.....	11.4	9.2	3.6	6.8	2.75	Same as B 3457 with corn germ meal.
B 4117	Krause Stock Feed.....	DeKerville.....	10.2	9.1	4.5	9.8		Same as B 3457 without hominy feed.
	Average.....		10.6	9.1	4.3	9.1		
Larrows Milling Co., Detroit, Mich.								
B 3352	Larrows Feed.....	{ G* F* } Detroit.....	20.0 20.6 9.1	5.0 4.2 10.9	14.0	62.00	Cottonseed meal, linseed meal, gluten feed, dried beet pulp, corn feed meal, wheat bran and middlings, salt.	
B 3466	Larrows Feed.....	Zeeland.....	10.0	20.6	4.7	11.6	62.00	Same as B 3352.
B 3506	Larrows Feed.....	Holland.....	10.1	19.6	4.0	11.6	64.00	Same as B 3352.
B 3905	Larrows Feed.....	Muskegon Heights.....	9.9	21.3	5.0	11.6	64.00	Same as B 3352 without corn feed meal.
B 4033	Larrows Feed.....	Owensdale.....	8.7	21.1	4.7	11.4	3.60	Same as B 3352 without corn feed meal.
B 4901	Larrows Feed.....	Wayne.....	10.7	21.7	4.0	11.6		Same as B 3352.
	Average.....		9.8	20.8	4.4	11.5		
B 3441	Larrows Big Six Complete Dairy Feed.....	{ G* F* } Detroit.....	21.0 23.3 10.7	4.0 5.5 6.9	18.0	62.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran and middlings, rye middlings, corn feed meal, salt.	
B 3483	Larrows Big Six Complete Dairy Feed.....	Forest Grove.....	10.4	22.2	4.5	7.4	62.00	Same as B 3441.
B 3753	Larrows Big Six Complete Dairy Feed.....	Howell.....	10.2	20.5	5.8	8.6	62.00	Same as B 3441.
B 3846	Larrows Big Six Complete Dairy Feed.....	Belmont.....	10.1	21.7	6.0	8.5	62.00	Same as B 3441.
B 4091	Larrows Big Six Complete Dairy Feed.....	Bad Axe.....	9.0	21.1	5.9	8.7	65.00	Same as B 3441.
B 4122	Larrows Big Six Complete Dairy Feed.....	Harbor Beach.....	9.8	21.6	6.0	8.1	3.35	Same as B 3441.
	Average.....		10.0	21.7	5.6	8.1		

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
McMoran Milling Co., Port Huron, Mich.								
B 4113	Protean Feed.	Staduary { G* F* }	10.3	20.0	5.0	19.0	\$2.85	Cottonseed meal, linseed meal, gluten feed, hominy feed, alfalfa meal, salt.
B 4119	Protean Feed.	Deckerville { F* Average. }	9.6	17.6	4.0	15.3	2.90	Cottonseed meal, linseed meal, gluten feed, wheat bran, pea bran, oat feed, salt.
Omaha Alfalfa Milling Co., Omaha, Neb.								
B 3928	Beauty Dairy Feed.	Holland { G* F* }	9.2	24.0	5.0	20.0	56.40	Cottonseed meal, linseed meal, alfalfa meal, wheat bran, corn meal.
B 3930	Beauty Dairy Feed.	Muskegon.	9.8	20.4	4.0	13.9		Same as B 3928.
B 3976	Beauty Dairy Feed.	Waukegan.	9.7	23.5	4.0	16.0		Same as B 3928.
B 4052	Beauty Dairy Feed.	Saginaw.	9.0	23.7	3.7	13.2	60.00	Same as B 3928.
B 4142	Beauty Dairy Feed.	Mariette.	9.8	18.6	4.2	13.7	3.15	Same as B 3928.
Park & Pollard Co., Chicago, Illinois.								
B 3413	Steven's 44 Dairy Ration.	Average.	9.5	21.0	4.0	15.1		Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers' grains, disilliers' grains, malt, groats, wheat bran and middlings, corn germ meal, oat feed, oil meal, pea meal, salt.
B 3423	Steven's 44 Dairy Ration.	Grand Rapids { G* F* }	9.2	24.0	5.0	11.0	64.00	Same as B 3413.
B 3670	Steven's 44 Dairy Ration.	Leaning.	8.7	24.6	5.4	13.4	3.50	Same as B 3413.
B 3852	Steven's 44 Dairy Ration.	Holland.	9.5	25.2	5.5	9.6	65.00	Same as B 3413.
B 3870	Steven's 44 Dairy Ration.	Algon.	9.2	22.7	6.4	9.0	68.00	Same as B 3413.
B 3963	Steven's 44 Dairy Ration.	Easton Rapids.	8.8	26.5	5.4	11.7	64.00	Same as B 3413.
B 4203	Steven's 44 Dairy Ration.	Fremont.	9.6	23.8	6.4	10.5	63.00	Same as B 3413.
B 4335	Steven's 44 Dairy Ration.	Traverse City.	9.8	26.3	5.6	10.1	3.40	Same as B 3413.
Purina Mills, St. Louis, Mo.								
B 4096	Lucky Strike Stock Food.	Average.	9.0	24.9	5.7	10.9		Cottonseed meal, hominy feed, oat meal mill by-products, corn meal, cottonseed hull bran, salt.
B 3925	Star Stock Food.	Almont. { G* F* }	11.0	11.0	5.0	15.0	2.50	Cottonseed meal, hominy feed, wheat middlings, oat meal mill by-products, corn feed meal, salt.
B 4146	Star Stock Food.	Grand Rapids { F* Brown City. }	9.2	11.8	3.8	12.8	58.00	Same as B 3925.
Quaker Oats Company, Chicago, Ill.								
B 3745	Big Q Dairy Ration.	Average.	9.1	12.3	4.3	13.2		Cottonseed meal, linseed meal, gluten feed, hominy feed, disilliers' grains, wheat bran and middlings, oat meal mill by-products, salt.
B 3774	Big Q Dairy Ration.	(1918) { G* Morris. }	9.0	22.0	4.9	11.2	60.00	Same as B 3745 with corn and molasses.
B 3774	Big Q Dairy Ration.	South Haven.	9.6	18.9	5.0	11.6	60.00	

B 3901	Big Q Dairy Ration.....	Grand Rapids.....	9.3	20.6	4.8	11.1	66.00	Same as B 3745.
B 4042	Big Q Dairy Ration.....	Saginaw.....	8.9	20.6	4.7	10.0	65.00	Same as B 3745.
B 4320	Big Q Dairy Ration.....	Manitowish.....	9.0	22.6	5.6	11.4	3.25	Same as B 3745.
B 4360	Big Q Dairy Ration.....	Lapeer.....	8.3	22.6	5.1	11.6	3.25	Same as B 3745.
	Average.....		9.1	21.2	5.1	11.2		
	(1910) { G.*							
B 4081	Big Q Dairy Ration.....	Caro.....	8.4	21.0	5.0	10.5		Same as B 3745.
B 4413	Big Q Dairy Ration.....	Ann Arbor.....	9.4	23.0	5.4	11.2	63.00	Same as B 3745.
B 4532	Big Q Dairy Ration.....	Traverse City.....	9.5	21.8	5.3	12.5	96.50	Same as B 3745.
	Average.....		9.1	21.9	5.4	11.3		
B 3743	Schumacher Feed.....	Mason.....	10.0	11.1	4.1	12.2	53.00	Cottonseed meal, hominy feed, wheat middlings, oat meal mill by-products, corn, barley, ground purified wheat and rice, calcium phosphate, salt.
B 4020	Schumacher Feed.....	Coldwater.....	8.7	10.8	4.2	11.3	55.00	Same as B 3743.
B 4043	Schumacher Feed.....	Caro.....	8.8	10.2	3.6	11.3	55.00	Same as B 3743.
B 4079	Schumacher Feed.....	Caro.....	9.8	10.4	3.4	11.2	53.00	Same as B 3743 with bran, without calcium phosphate.
B 4201	Schumacher Feed.....	Middleville.....	8.5	11.9	4.8	11.2	60.00	Same as B 3743.
B 4240	Schumacher Feed.....	Cadillac.....	9.7	10.7	4.7	10.7	56.00	Same as B 3743 without calcium phosphate.
B 4427	Schumacher Feed.....	Morenci.....	9.4	11.3	3.7	10.7	60.00	Same as B 3743.
B 4821	Schumacher Feed.....	Manitowish.....	9.5	10.2	3.8	11.0	2.80	Same as B 3743.
B 4830	Schumacher Feed.....	Traverse City.....	9.0	11.0	4.2	11.0	2.75	Same as B 3743.
	Average.....		9.2	10.8	4.1	10.9		
B 4992	Sterling Feed.....	Jackson.....	10.0	11.3	3.4	8.5	2.75	Cottonseed meal, linseed meal, hominy feed, wheat middlings, oat meal mill by-products, ground purified wheat and rice, barley screenings, calcium phosphate and salt.
B 4636	Vitality Stock Feed.....	Grand Rapids.....	12.4	8.3	2.6	8.1	2.85	Wheat bran, oat hulls, ground oats and barley, corn feed meal, salt.
B 4334	Pickford Dairy Ration.....	Sault Ste. Marie, F.*	13.0	5.6	5.9			Wheat bran and middlings, corn bran, barley feed, ground flax, ground mixed grain.
B 4565	Pickford Dairy Ration.....	Pickford.....	11.7	14.6	4.2	7.5	70.00	Same as B 4334 with corn meal and screenings.
	Average.....		11.4	14.0	4.1	7.3		
B 4564	Pickford Star Feed.....	Pickford.....	12.4	2.6	5.3			Ground peas, ground wheat, wheat middlings, ground oats, corn meal, ground barley, grain screenings.
B 4550	4 All Stock Feed.....	Sternumon.....	12.6	4.0	15.0			Cottonseed meal, linseed meal, hominy feed, wheat bran, oat meal mill by-products, salt.
B 3812	Wisconsin Viter Dairy Feed.....	Marshall.....	10.3	13.3	3.8	12.3	60.00	Cottonseed meal, linseed meal, brewers' grains, distillers' grains, malt sprouts, gluten feed, hominy feed, wheat bran, salt.
B 3987	Wisconsin Viter Dairy Feed.....	Lake Odessa.....	9.1	25.3	5.5	12.5	66.00	Same as B 3812 with corn oil meal.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fibre.	Price per ton or cwt.	Principal ingredients identified.
Smith, Parry & Co., Milwaukee, Wis.—Con.								
B 4088	Wisconsin Vitex Dairy Feed.	Bad Axe.	9.0	24.7	6.1	11.8	\$66.00	Same as B 3987.
B 4099	Wisconsin Vitex Dairy Feed.	Cass City.	9.8	24.7	6.1	11.9	65.00	Same as B 3987.
B 4169	Wisconsin Vitex Dairy Feed.	Litchfield.	9.0	25.1	6.2	12.6	66.50	Same as B 3987.
B 4375	Wisconsin Vitex Dairy Feed.	Houghton.	9.3	24.8	7.2	10.7	3.50	Same as B 3987.
B 4596	Wisconsin Vitex Dairy Feed.	Bark River.	9.3	23.8	6.4	12.7	4.25	Same as B 3987.
		Average.	9.3	24.6	6.3	11.9	.....
Uniko Milling Co., Cincinnati, Ohio.								
B 3184	Union Grains Uniko Bites Ready Ration Dairy Feed.	Coopersville.	{ G. F. } 7.9	24.1	7.0	9.7	68.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, distillers' grains, brewers' grains, wheat bran and middlings, corn germ meal, malt sprouts, salt.
B 3760	Union Grains Uniko Bites Ready Ration Dairy Feed.	Howell.	8.7	24.0	5.5	9.7	67.00	Same as B 3184.
B 4013	Union Grains Uniko Bites Ready Ration Dairy Feed.	Coldwater.	8.5	23.3	5.8	8.2	67.00	Same as B 3184.
B 4021	Union Grains Uniko Bites Ready Ration Dairy Feed.	Coldwater.	8.9	23.9	5.7	10.3	66.80	Same as B 3184.
		Average.	8.5	23.8	6.0	9.5	.....
Wagner White Co., Inc., Jackson, Mich.								
B 4200	Cooperative Dairy Feed.	Tecumseh.	{ G. F. } 9.4	21.5	4.0	18.0	59.55	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran and middlings, oats, salt.
B 4428	Cooperative Dairy Feed.	Morenci.	8.9	25.2	5.0	9.9	64.00	Same as B 4200.
B 4440	Cooperative Dairy Feed.	Dundee.	8.5	22.2	4.3	10.4	.....	Same as B 4200.
		Average.	8.7	23.7	4.7	10.2	.....
Golden Cream Dairy Feed.								
B 3406	Golden Cream Dairy Feed.	Coopersville.	{ G. F. } 9.2	20.0	3.6	20.0	58.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran, oat meal mill by-product, salt.
B 3491	Golden Cream Dairy Feed.	Vriesland.	9.0	23.0	4.0	10.5	56.00	Same as B 3406 without hominy feed.
B 3838	Golden Cream Dairy Feed.	Wayland.	9.2	22.9	4.8	13.4	55.00	Same as B 3491.
B 4003	Golden Cream Dairy Feed.	Deversaux.	8.1	19.4	4.8	15.6	58.00	Same as B 3491 with middlings.
B 4917	Golden Cream Dairy Feed.	Plymouth.	8.4	21.8	4.8	16.1	58.00	Same as B 3406.
		Average.	8.8	21.6	4.4	14.2	.....
Wawco Dairy Feed.								
B 3728	Wawco Dairy Feed.	Mason.	{ G. F. } 9.4	26.3	5.1	18.0	65.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran, oats, salt.
B 4919	Wawco Dairy Feed.	Plymouth.	8.7	25.9	6.1	10.3	68.00	Same as B 3728.
		Average.	9.2	26.1	5.6	9.7	.....

E. L. Wellman, Grand Rapids, Mich.		{ G.* F.* }		{ 21.0 19.7 }		{ 6.0 4.8 }		{ 10.6 12.7 }		Cottonseed meal, gluten feed, hominy feed, distillers' grains, wheat bran and middlings, oat meal mill by-product, calcium carbonate salt.	
B 3854	Qualified Dairy Feed.....			9.8						65.00	
B 3954	Qualified Dairy Feed.....			8.6	20.7	5.5	11.6	56.00			
B 4203	Qualified Dairy Feed.....			8.9	22.4	4.4	11.9	60.00			Same as B 3954 without calcium carbonate.
B 4417	Qualified Dairy Feed.....			8.3	21.7	6.1	11.0	2.75			Same as B 3954.
B 4594	Qualified Dairy Feed.....			9.6	23.3	5.2	8.9	3.50			Same as B 3954.
B 4864	Qualified Dairy Feed.....			9.7	19.6	4.2	13.0	3.20			Same as B 3954 without hominy feed.
B 4867	Qualified Dairy Feed.....			9.9	21.8	4.7	11.3	3.00			Same as B 3954.
Average.....				9.3	21.3	4.8	11.5				
B 3169	Wellman's Qualified Feed.....	{ G.* F.* }		8.0 8.8	5.8 3.7	9.0 10.3	55.00				Hominy feed, ground corn, oat meal mill by-product, calcium phosphate, salt.
Western Grain Products Co., Hammond, Ind.											
B 4254	Calumet Dairy Feed.....	{ G.* F.* }		20.0 20.9	4.6 3.9	14.8 15.2	59.00				Cottonseed meal, gluten feed, brewers' grains, wheat bran, ground corn, ground screenings, clipped oat by-product, salt.
B 4421	Calumet Dairy Feed.....	{ G.* F.* }		8.3 8.7	19.8 4.0	15.7	3.00				Same as B 4254.
Average.....				8.5	20.4	4.0	15.5				
B 4793	Young Randolph Seed Co., Owosso, Mich.	{ G.* F.* }		12.0 13.0	4.5 2.7	8.0 7.4	55.00				Wheat bran, oats, corn, velvet bean feed meal.
MOLASSES DAIRY AND STOCK FEEDS.											
American Milling Co., Peoria, Ill.											
B 3751	Amco Dairy Feed.....	(1918) { G.* F.* }		25.0 26.3	8.0 5.7	16.0 15.2	62.00				Cottonseed meal, linseed meal, distillers' grains, corn, palm kernel meal, peanut oil meal, cooked oat by-product, coconut oil meal, molasses, salt.
B 4192	Amco Dairy Feed.....			7.8	27.6	5.4	14.3	64.00			Same as B 3751 without corn, peanut oil meal, palm kernel meal.
Average.....				8.5	27.0	5.6	14.8				
B 4426	Amco Dairy Feed.....	(1919) { G.* F.* }		26.0 24.7	6.0 5.0	12.0 14.2	66.00				Cottonseed meal, linseed meal, distillers' grains, coconut oil meal, clipped oat by-product, molasses, salt.
B 3752	Amco Fat Maker.....	{ G.* F.* }		10.0 9.7	3.5 3.2	12.0 11.8	50.00				Distillers' grains, oats, corn, clipped oat by-product, molasses, salt.
B 4516	Amco Fat Maker.....			13.9	9.7	3.3	7.5	52.00			Same as B 3752.
Average.....				12.5	9.7	3.3	9.7				
B 8331	Sucrose Dairy Feed.....	{ G.* F.* }		16.6 17.0	9.6 4.6	14.0 13.5	47.85				Cottonseed meal, gluten feed, distillers' grains, alfalfa meal, palm kernel meal, clipped oat by-product, ground screenings, molasses, salt.
B 3402	Sucrose Dairy Feed.....			11.2	17.6	3.7	12.4	50.00			Cottonseed meal, distillers' grains, corn germ meal, ground screenings, clipped oat by-product, coconut meal, molasses, calcium carbonate, salt.

*Abbreviations for Guaranteed and Found

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 3818 B 4373 B 4881	American Milling Co., Peoria, Ill.—Con. Sorens Dairy Feed Sorens Dairy Feed Sorens Dairy Feed	Holland	8.6	19.2	4.8	14.2	\$49.35	Same as B 3402.
		Houghton	9.7	18.4	5.8	13.5	54.00	Same as B 3402 without salt and calcium carbonate.
		Ludington	9.6	18.0	5.0	12.6	2.75	Cottonseed meal, gluten feed, distillers' grains, clipped oat by-product, ground screenings, molasses, salt.
		Average	9.8	18.0	4.8	13.2		Cottonseed meal, gluten feed, coconut oil meal, clipped oat by-product, ground screenings, molasses, salt.
		Excelsior	10.8	17.4	2.6	14.0	49.00	Cottonseed meal, brewers' grains, malt sprouts, gluten feed, ground oat and grain by-products, molasses.
B 4517	Tip Top Sugared Feed Aready Farms Milling Co., Chicago, Ill. Aready Dairy Feed Aready Dairy Feed	Marshall	8.9	17.4	4.7	14.5	40.00	Cottonseed meal, distillers' grains, corn feed meal (trace), corn, ground screenings, ground clipped oat by-product, molasses.
		Hartford	8.8	18.5	4.0	17.4	50.00	Cottonseed meal, gluten feed, brewers' grains, malt sprouts, clipped oat by-product, ground grain screenings, molasses, salt.
		Carson City	9.0	16.5	4.7	15.3	46.00	Same as B 3920.
		Ithaca	7.4	16.9	4.3	15.5	48.00	
		Scottville	9.2	20.6	4.0	15.6	2.00	
B 3791	Producers Ready Ration J. E. Bartlett Co., Jackson, Mich. Farmer Brand Molasses Ration	Average	8.7	18.0	4.3	15.7		Cottonseed meal, gluten feed, wheat bran and middlings, oat meal mill by-products, molasses, salt.
		Hartford	9.7	19.0	4.0	11.0	57.00	
		Howell	14.0	18.0	5.5	16.0	48.00	Cottonseed meal, distillers' grains, oat meal mill by-products, velvet bean feed, ground grain screenings, molasses, calcium phosphate, salt.
		Bangor	15.5	11.0	1.5	8.0		Cottonseed meal, wheat bran, ground corn, wheat screenings, ground flax, charred post, molasses.
		Average	15.5	12.2	1.0	17.5		
B 4227	Champion Feed Milling Co., Lyons, Iowa. Champion Molasses Feed Albert Dickinson Co., Chicago, Ill. Honeyuckle Feed Honeyuckle Feed	Orosco	10.0	10.0	0.6	25.0	50.00	Alfalfa meal, molasses.
		Manistee	15.9	12.8	0.9	16.4	3.25	Same as B 3718.
		Average	15.1	11.6	1.0	18.6		
B 3718 B 4868								

Dixie Mills Co., East St. Louis, Ill.		{ G. F. }		{ 16.6 15.6 }		{ 5.5 5.7 }		{ 17.0 15.6 }		Cottonseed meal, clipped oat by-product, ground grain screenings, molasses.
Diamond Dairy Feed		{ G. F. }		{ 16.6 15.6 }		{ 5.5 5.7 }		{ 17.0 15.6 }		
Halse & Edwards Co., Chicago, Ill.										
B 3465	Gold Flake Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		Cottonseed meal, linseed meal, gluten feed, clipped oat by-product, ground screenings from wheat, barley and kafir, molasses, salt. Same as B 3465. Same as B 3465. Same as B 3465. Same as B 3465, with flaxseed screenings.
B 3811	Gold Flake Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4380	Gold Flake Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4380	Gold Flake Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4326	Gold Flake Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
International Sugar Feed Co., Minneapolis, Minn.										
B 4115	International Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		Cottonseed meal, wheat bran, gluten meal (trace), screenings, molasses, salt.
B 4131	International Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4330	International Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		Cottonseed meal, linseed meal, clipped oat by-product, screenings, molasses.
B 4330	International Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
Interstate Feed Association, Toledo, Ohio.										
B 3762	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		Cottonseed meal, clipped oat by-product, ground grain screenings, molasses, salt. Same as B 3762 with wheat bran. Same as B 3762 with linseed meal. Same as B 3921. Same as B 3762. Same as B 3762. Same as B 3921. Same as B 3921 with wheat bran. Same as B 3921. Same as B 3921.
B 3829	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 3921	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4006	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4024	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4060	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4073	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4149	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
B 4306	Mormilk Ready Ration Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		
Chas. A. Krause Milling Co., Milwaukee, Wis.										
B 4376	Badger Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		Cottonseed meal, alfalfa meal, ground screenings from wheat, oats, and flax, molasses, salt. Same as B 4376.
B 4379	Badger Dairy Feed	{ G. F. }		{ 16.0 18.3 }		{ 5.5 3.2 }		{ 15.0 12.6 }		

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
	Chas. A. Kraus Milling Co., Milwaukee, Wis.—Con.							
B 4856	Sweet Cud Dairy Feed	Manistee { G.* F.*	24.0 9.3	24.0 24.7	3.7 4.1	16.0 13.2	\$3.00	Cottonseed meal, gluten feed, alfalfa meal, molasses, salt.
B 3629	Farnel Dairy Feed	Detroit { G.* F.*	11.1	23.0 22.1	4.0 4.8	12.0 11.2	60.00	Cottonseed meal, linseed meal, gluten meal, malt sprouts, wheat bran, molasses, salt.
B 4030	Omaha Alfalfa Milling Co., Omaha, Nebraska.							
	Cream Alfalfa Dairy Feed No. 1	Saginaw { G.* F.*	9.7	20.0 19.5	3.0 3.1	18.0 12.1	60.00	Cottonseed meal, alfalfa meal, wheat bran, corn, molasses.
B 4031	Green Meadow Dairy Feed	Saginaw { G.* F.*	13.7	11.0 13.1	1.0 0.8	25.0 17.5	51.00	Alfalfa meal, molasses.
B 4377	Green Meadow Dairy Feed	Houghton	13.2	11.3	0.8	20.1	2.50	Same as B 4031.
B 4454	Green Meadow Dairy Feed	Mt. Morris	14.5	11.8	1.0	16.2	2.30	Same as B 4031.
	Purina Mills, St. Louis, Mo.							
B 3445	Purina Cow Chow Feed	Average	14.5	12.1	0.9	17.9	.....	Cottonseed meal, linseed meal, gluten feed, hominy feed, alfalfa meal, molasses, salt.
B 3706	Purina Cow Chow Feed	Grand Rapids	21.0	21.0	4.8	18.0	.....	Same as B 3445.
B 3706	Purina Cow Chow Feed	St. Joseph	10.5	26.5	4.8	10.7	64.00	Same as B 3445.
B 3706	Purina Cow Chow Feed	Kalamazoo	9.5	23.9	4.2	11.6	60.00	Same as B 3445.
B 4114	Purina Cow Chow Feed	St. Joseph	9.1	26.5	4.7	13.5	.....	Same as B 3445.
B 4137	Purina Cow Chow Feed	St. Joseph	10.6	26.0	4.8	10.0	3.50	Same as B 3445.
B 4223	Purina Cow Chow Feed	Crowsley	9.5	24.7	4.2	11.4	3.50	Same as B 3445.
B 4223	Purina Cow Chow Feed	Benton Harbor	9.7	24.3	4.5	10.4	63.00	Same as B 3445.
B 4457	Purina Cow Chow Feed	Leipsburg	9.6	24.1	4.8	13.2	2.25	Same as B 3445 with corn.
	Quaker Oats Co., Chicago, Ill.							
B 3765	Blue Ribbon Dairy Feed	Average	9.8	25.1	4.6	11.5	.....	Cottonseed meal, hominy feed, wheat bran, oat meal, mill by-products, calcium phosphate, molasses, salt.
B 3765	Blue Ribbon Dairy Feed	Howell	9.7	22.8	5.4	13.2	61.00	Same as B 3765 with distillers' grains.
B 4202	Blue Ribbon Dairy Feed	South Haven	8.8	22.2	5.0	12.9	65.00	Same as B 3765 with linseed meal and velvet bean feed.
B 4400	Blue Ribbon Dairy Feed	Fremont	9.5	23.2	5.1	14.0	63.00	Same as B 3765.
B 4400	Blue Ribbon Dairy Feed	Ann Arbor	10.0	21.8	5.7	13.3	3.00	Same as B 3765.
B 4667	Blue Ribbon Dairy Feed	Mt. Clemens	7.9	23.3	4.9	13.5	62.50	Same as B 3765.
	Quaker Dairy Feed with Molasses							
B 3746	Quaker Dairy Feed with Molasses	Average	9.2	22.7	5.2	13.4	.....	Cottonseed meal, distillers' grains, oat meal, mill by-products, palm kernel oil meal, ground grain screenings, velvet bean feed, molasses, calcium phosphate, salt.
		Morris	10.7	16.0	3.8	14.5	.....

B 4410 B 4909	Quaker Dairy Feed with Molasses. Quaker Dairy Feed with Molasses.	Ann Arbor..... Denton..... Average.....	10.4 13.5 11.5	12.3 15.3 16.9	4.5 4.6 4.3	15.1 15.1 15.2	2.50 2.25	Same as B 3746 without velvet bean feed. Same as B 3746 without palm kernel oil meal and calcium phosphate.
B 3173	E. L. Wellman, Grand Rapids, Mich. Feeders Favorite Dairy Feed.....	Grand Rapids... { G.* F.*	8.1	18.0	4.1	13.6	44.00	Cottonseed meal, linseed meal, distillers' grains, wheat bran, palm kernel oil meal, oat meal mill by-products, ground grain screenings, molasses, calcium phosphate, salt.
B 3973 B 4111	Feeders Favorite Dairy Feed..... Feeders Favorite Dairy Feed.....	Evart..... Sandusky.....	8.6 10.0	17.6 18.6	4.8 4.3	13.0 15.9	52.00 62.00	Same as B 3173 without linseed meal and wheat bran. Same as B 3973.
B 3190	Western Grain Products Co., Hammond, Ind. Hammond Dairy Feed.....	Average.....	9.3	18.1	4.6	14.5	.....	Cottonseed meal, distillers' grains, malt sprouts, ground grain screenings, clipped oat by-product, molasses, salt.
B 3425	Hammond Dairy Feed.....	Grand Rapids... { G.* F.*	9.8	17.8	4.8	12.7	50.00	Cottonseed meal, clipped oat by-product, molasses, salt.
B 3437	Hammond Dairy Feed.....	Numb.....	10.2	16.9	4.3	15.2	50.00	Cottonseed meal, clipped oat by-product, molasses, salt.
B 3952	Hammond Dairy Feed.....	Jamestown.....	11.3	16.3	3.7	13.5	50.00	Same as B 3425 with alfalfa meal.
B 3420	Hammond Dairy Feed.....	Greenville.....	8.9	16.5	4.3	15.0	52.00	Same as B 3425.
B 4409	Hammond Dairy Feed.....	Conklin.....	10.4	18.2	5.0	13.8	52.00	Same as B 3425 with malt sprouts.
B 4809	Hammond Dairy Feed.....	Morenci.....	10.4	16.6	4.6	12.2	2.85	Same as B 3190.
B 4811	Hammond Dairy Feed.....	Gaylord.....	9.6	17.3	4.4	14.3	2.50	Same as B 3190.
B 4995	Hammond Dairy Feed.....	Boys City.....	10.0	16.1	3.9	14.4	3.00	Same as B 3190.
		Chelsea.....	10.0	16.9	4.1	14.9	.....	Same as B 3190.
		Average.....	10.1	17.0	4.3	14.0	.....
B 4411	Kurwek Horse Feed.....	Ann Arbor... { G.* F.*	11.9	9.5 10.0	2.5 4.6	10.0 5.7	2.85	Oats, corn, barley.
B 3360	Fambella Common Sense Horse Feed.....	Detroit... { G.* F.*	10.5	9.7 12.0	5.5 3.0	6.0 10.9	52.00	Oats, barley, cracked corn, oat hulls.
B 3696 B 3810 B 4886	Excelsior Horse Feed..... Excelsior Horse Feed..... Excelsior Horse Feed.....	Lansing... { G.* F.* Holland..... Charlevoix.....	11.4 11.2 10.3	10.0 9.8 10.7	5.0 3.8 4.3	8.0 5.4 5.6	3.40 64.00 3.20	Rolled oats, rolled barley, cracked corn. Same as B 3696. Same as B 3696.
B 4939	Quaker Oats Co., Chicago, Ill. Schumacher Special Horse Feed.....	Average.....	11.0	10.2	3.7	5.0	.....	Oat meal mill by-products, corn, salt.
B 3197 B 3775 B 4093	White Diamond Feed..... White Diamond Feed..... White Diamond Feed.....	Birmingham... { G.* F.* Grand Rapids... { G.* F.* South Haven..... Elkton.....	10.8 10.4 10.4 9.9 10.5	9.8 10.4 8.0 8.7 8.9	5.8 3.8 5.8 3.3 3.9	8.0 7.9 9.0 9.1 8.2	3.15 2.75 55.00 65.00	Hominy feed, ground corn, corn feed meal, oat meal mill by-products, salt. Same as B 3197 without corn feed meal, with calcium phosphate. Same as B 3197.

*Abbreviations for Guaranteed and Found.

†The brand listed below was licensed by the Fambella Co., whose business has been taken over by this company.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Quaker Oats Co., Chicago, Ill.—Con.								
B 4210	White Diamond Feed	Niles	9.9	8.6	3.3	8.2	\$65.00	Same as B 3197 with ground kafir and calcium phosphate.
B 4822	White Diamond Feed	Manassas	10.4	9.1	3.8	7.7	2.90	Hominy feed, oat meal mill by-products, ground corn, calcium phosphate, salt.
B 4855	White Diamond Feed	Manassas	10.5	8.9	4.4	7.8	3.00	Hominy feed, oat meal mill by-products, ground corn, barley, salt.
E. L. Wellman, Grand Rapids, Mich.								
		Average	10.3	8.9	3.7	8.1	.....
		(1918) { G.*						
B 3171	Qualified Horse Feed	Grand Rapids	9.7	8.0	5.5	9.0	.....	Hominy feed, ground corn, oat meal mill by-products, calcium phosphate, salt.
B 3424	Qualified Horse Feed	Grand Rapids	10.6	8.8	3.8	3.15	56.00	Same as B 3171 without hominy feed.
B 4094	Qualified Horse Feed	Elkton	10.2	8.9	3.9	7.3	75.00	Same as B 3171.
		Average	10.2	8.8	3.7	7.8	.....
		(1919) { G.*						
B 4475	Qualified Horse Feed	Fenton	10.3	8.3	5.4	9.0	.....	Same as B 3171.
B 4593	Qualified Horse Feed	East Jordan	11.2	9.2	4.1	6.7	2.75	Same as B 3171 with barley.
B 4623	Qualified Horse Feed	Manassas	11.3	9.0	3.6	4.2	3.40	Same as B 3171 with barley.
		Average	10.9	9.4	3.7	5.2	.....
MOLASSES HORSE FEEDS.								
American Milling Co., Peoria, Illinois.								
B 3341	Peoria Horse Feed	Detroit { G.*	10.0	10.0	5.5	14.0	.....	Corn, alfalfa meal, oats, oat meal mill by-products, molasses, salt.
B 3657	Peoria Horse Feed	Detroit { F.*	14.3	9.4	3.0	10.7	53.00	Same as B 3341 without oat meal mill by-products.
B 3729	Peoria Horse Feed	Detroit	13.6	8.9	2.6	12.2	53.50	Same as B 3657.
B 3860	Peoria Horse Feed	Grand Rapids	11.6	10.0	3.6	11.4	54.00	Same as B 3341.
B 4379	Peoria Horse Feed	Hancock	15.7	9.2	2.9	12.3	60.00	Same as B 3341.
		Average	15.0	10.5	2.1	15.9	.....
		(1919) { G.*	14.0	9.6	2.8	12.5	.....
B 4357	Sucrose Horse and Mule Feed	Negaunee { G.*	.....	9.0	5.5	12.0	.....	Oats, corn, oat meal mill by-products, molasses, salt.
		{ F.*	13.4	8.5	5.8	10.0	3.50	
B 3342	Sucrose Horse Feed with Alfalfa	Detroit { G.*	10.0	10.0	5.5	12.0	.....	Corn, oats, barley, alfalfa meal, molasses, salt.
B 3316	Sucrose Horse Feed with Alfalfa	Holland { F.*	14.3	10.2	3.4	8.6	58.00	Same as B 3342 without salt.
B 4615	Sucrose Horse Feed with Alfalfa	Escanaba	12.3	10.7	3.4	8.8	61.35	Same as B 3342 without barley.
		Average	14.3	9.8	3.4	7.0	58.50	
		(1919) { G.*	13.6	10.2	3.4	8.1	.....

B 3502 B 4714	Arady Farms Milling Co., Chicago, Ill. Country Gentleman Horse Feed Country Gentleman Horse Feed	(1918) { G.* F.* Detroit Rochester Average	9.0 15.1 11.3 6.2 10.7	{ 9.0 4.0 2.7 16.0 12.8 3.4	15.1 16.0 17.2 16.2	51.00 3.00	Alfalfa meal, oats, corn, molasses. Same as B 3502.
B 4408	Country Gentleman Horse Feed	(1919) { G.* F.* Jackson Average	9.0 14.0 11.4	{ 9.0 1.5 2.9 16.0 15.0	16.0 15.0	2.90	Same as B 3502.
B 3722 B 4224 B 4920	J. J. Badenoeh Co., Chicago, Ill. Gleakost Horse Feed Gleakost Horse Feed Gleakost Horse Feed	{ G.* F.* Owosso Coloma Plymouth Average	10.0 14.7 11.0 13.8 13.6 14.0	{ 10.0 1.8 2.5 12.3 11.6 11.1	16.0 15.4 12.3 11.7 13.1	60.00 60.00 56.50	Alfalfa meal, oats, corn, molasses. Same as B 3722 with barley. Same as B 3722 with barley.
B 3804 B 4033 B 4928 B 4834	Albert Dickinson Co., Chicago, Ill. Hobby Horse Feed Hobby Horse Feed Hobby Horse Feed Hobby Horse Feed	{ G.* F.* Holland Saginaw Kalkaska Traverse City Average	9.0 14.3 12.3 13.8 13.0 13.4	{ 9.0 2.5 1.9 13.4 2.0 2.1	16.0 12.4 13.4 13.9 13.3	61.00 61.00 3.00 3.20	Alfalfa meal, oats, corn, molasses. Same as B 3804. Same as B 3804. Same as B 3804.
B 4826 B 4860	Halse & Edwards Co., Chicago, Ill. Harvest Horse Feed Harvest Horse Feed	{ G.* F.* Kalkaska Manistee Average	10.0 14.7 13.8 12.4 13.4	{ 9.0 2.3 2.5 12.0 11.7	15.0 12.2 12.0 12.1	3.00 3.00	Alfalfa meal, oats, cracked corn, barley, molasses. Same as B 4826.
B 4885 B 4910	Kingalfa Horse Feed Kingalfa Horse Feed	{ G.* F.* Charlevoix Wayne Average	10.0 13.6 16.8 12.7 15.2	{ 9.0 2.5 2.9 11.5 12.3	16.0 11.5 10.5 11.0	3.00	Alfalfa meal, oats, cracked corn, barley, molasses. Same as B 4885.
B 3435 B 3634 B 4092 B 4844 B 4945	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Horse Feed Badger Horse Feed Badger Horse Feed Badger Horse Feed Badger Horse Feed	{ G.* F.* Grand Haven Holland Ypsilanti Traverse City Detroit Average	10.0 15.5 13.3 14.1 15.0 16.1 14.8	{ 9.0 2.3 2.1 2.8 2.4 2.0 2.3	16.0 12.2 12.2 11.3 12.9 13.8 12.5	3.30 62.00 3.00 2.90 52.00	Alfalfa meal, oats, corn, molasses. Same as B 3435. Same as B 3435. Same as B 3435. Same as B 3435.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Chas. A. Krause Milling Co., Milwaukee, Wis.—Con.								
B 3177	Krause Horse Feed	Hudsonville..... { G.* F.*	9.4	10.0	2.6	10.0	\$63.00	Corn, oats, alfalfa meal, molasses, salt.
B 4944	Krause Horse Feed	Detroit..... { G.* F.*	15.5	11.5	2.4	11.5	53.00	Same as B 3177.
		Average.....	12.5	11.0	2.3	8.7		
N. R. G. Horse Feed								
B 3778	N. R. G. Horse Feed	South Haven..... { G.* F.*	14.3	10.0	3.0	10.0		Alfalfa meal, oats, corn, molasses, salt.
B 4236	N. R. G. Horse Feed	Paw Paw..... { G.* F.*	9.6	10.8	3.1	7.9	60.00	Same as B 3778 without alfalfa meal.
		Average.....	12.0	11.1	3.7	7.8	3.60	
Pul-Mor Horse Feed								
B 3342	Pul-Mor Horse Feed	Detroit..... { G.* F.*	17.6	9.0	1.0	16.0	50.00	Oats, corn, alfalfa meal, oat meal mill by-products, flax plant refuse, molasses.
Lichtenberg & Son, Detroit, Mich.								
B 3631	Faramel Horse Feed	Detroit (1918) { G.* F.*	10.8	10.0	3.6	8.0		Oats, corn, molasses.
B 4752	Faramel Horse Feed	Detroit (1919) { G.* F.*	11.3	10.7	3.8	6.4		Wheat bran, oats, corn, molasses, salt.
Omaha Alfalfa Milling Co., Omaha, Neb.								
B 3751	Alborno Horse Feed	South Haven..... { G.* F.*	15.1	10.9	2.2	12.4	55.00	Alfalfa meal, oats, corn, molasses.
B 3948	Omaha Special Horse Feed	Kalamazoo..... { G.* F.*	12.9	11.4	1.9	11.5	66.00	Alfalfa meal, oats, corn, molasses, salt.
B 4034	Peerless Horse Feed	Saginaw (1918) { G.* F.*	11.9	10.7	1.8	11.0	60.00	Alfalfa meal, oats, corn, molasses, charcoal.
B 4325	Peerless Horse Feed	South St. Marie.....	10.5	12.8	2.5	12.7	61.90	Same as B 4034 without charcoal.
B 4513	Peerless Horse Feed	Escanaba.....	17.7	9.9	2.2	11.5	61.90	Same as B 4325.
		Average.....	13.4	11.1	2.2	2.0		
Peerless Horse Feed								
B 3643	Peerless Horse Feed	Detroit (1919) { G.* F.*	15.0	10.4	2.5	11.2	61.00	Alfalfa meal, oats, corn, molasses.
B 3654	Peerless Horse Feed	Detroit.....	15.0	9.9	2.5	10.8	3.25	Same as B 3643.
B 4376	Peerless Horse Feed	Houghton.....	13.6	9.7	2.8	10.1	3.00	Same as B 3643.
		Average.....	14.5	10.0	2.6	10.7		

B 3782	Perfection Horse Feed	South Haven.....	{ G.* F.*	13.3 13.7	10.0 10.3 10.7	2.7 3.0 8.7	12.0 10.2 8.7	60.00 56.00	Alfalfa meal, oats, corn, molasses. Same as B 3782.
B 3981	Perfection Horse Feed	Grand Rapids.....							
		Average.....		13.5	10.5	2.9	9.5		
B 3800	Good Luck Feed with Molasses	Hartford.....	{ G.* F.*	14.6 9.7	9.0 11.6 2.7	1.5 2.7 12.1	15.9 12.1 8.0		Alfalfa meal, oats, corn, molasses, salt.
B 3796	Purina O-Molene Feed	Hartford.....	{ G.* F.*	14.2 14.0	10.1 9.7	3.8 3.6	7.0 6.8	73.00	Alfalfa meal, oats, corn, molasses. Same as B 3796 with salt.
B 3926	Purina O-Molene Feed	Grand Rapids.....							
		Average.....		14.1	9.9	3.7	6.9		
POULTRY FEEDS.									
Amenett Milling Co., Monroe, Mich.									
B 4729	Ameco Chick Feed	Trenton.....	{ G.* F.*	9.9 8.8	10.0 13.3 2.9	2.6 2.6	5.0 2.4	4.00	Wheat, hulled oats, cracked corn, kafir, milo, millet, grit.
B 4435	Ameco Poultry Mash	Monroe.....	{ G.* F.*	8.8 10.9	23.5 20.7	6.5 4.8	6.6 6.9	3.85 4.00	Linseed meal, gluten feed, meat scraps, wheat bran and middlings. out feed, corn feed meal, dried milk.
B 4495	Ameco Poultry Mash	Ypsilanti.....							Same as B 4435 without dried milk, with charcoal and salt.
B 4728	Ameco Poultry Mash	Trenton.....		8.9	21.3	5.1	6.8	4.25	Same as B 4495 without charcoal.
		Average.....		9.5	21.8	5.5	6.8		
B 3554	Ameco Scratch Grain	Detroit.....	{ G.* F.*	11.0 10.3	10.0 10.2 2.9	2.5 2.8	3.4 4.0	4.00	Linseed cake, wheat, oats, cracked corn, kafir, milo, buckwheat.
B 4731	Ameco Scratch Grain	Trenton.....							Barley, wheat screenings, sunflower, charcoal.
B 4924	Ameco Scratch Grain	Millford.....		12.0	10.5	2.8	4.0	3.65	Same as B 3554 without sunflower and charcoal.
		Average.....		11.1	11.5	2.7	3.8		Same as B 4731.
B 3548	Ameco Scratch Grain with Grit	Detroit.....	{ G.* F.*	11.8 11.1	10.0 10.3 10.0	2.5 2.8	5.0 3.2	3.90	Same as B 3554.
B 4450	Ameco Scratch Grain with Grit	Blissfield.....						4.00	Same as B 3554 with grit.
		Average.....		11.5	10.2	2.9	3.4		
B 3339	Cluck Cluck Scratch Feed	Detroit.....	{ G.* F.*	12.5 11.3	10.0 10.1 2.9	2.5 2.9	5.0 3.2	3.75	Wheat, oats, corn, kafir, buckwheat, barley, sunflower.
B 3375	Cluck Cluck Scratch Feed	Detroit.....		11.3	10.1	2.9	3.2	3.90	Same as B 3339.
B 3377	Cluck Cluck Scratch Feed	Detroit.....		11.3	10.1	2.9	3.2	3.75	Same as B 3339.
B 3518	Cluck Cluck Scratch Feed	Detroit.....		11.3	10.2	2.8	2.6	3.75	Same as B 3339.
B 3543	Cluck Cluck Scratch Feed	Detroit.....		12.3	9.8	2.8	2.6	3.75	Same as B 3339.
B 3547	Cluck Cluck Scratch Feed	Detroit.....		12.3	10.0	2.8	2.8	4.25	Same as B 3339.
B 3547	Cluck Cluck Scratch Feed	Detroit.....		12.3	10.2	2.8	2.8	3.75	Same as B 3339.
B 3574	Cluck Cluck Scratch Feed	Detroit.....		12.3	9.6	2.6	2.9	3.75	Same as B 3339.
B 3582	Cluck Cluck Scratch Feed	Detroit.....		11.7	10.3	3.2	2.9	4.00	Same as B 3339.
B 3751	Cluck Cluck Scratch Feed	Detroit.....		12.2	9.6	3.1	2.9	3.70	Same as B 3339.
B 3840	Cluck Cluck Scratch Feed	Detroit.....		12.4	10.4	3.2	3.4	3.55	Same as B 3339 without buckwheat.
B 4365	Cluck Cluck Scratch Feed	Kalamazoo.....		11.5	10.1	3.4	2.8	3.50	Same as B 3339.
B 4901	Cluck Cluck Scratch Feed	Ypsilanti.....		12.9	10.2	3.4	3.2	3.25	Same as B 3339.
		Average.....		12.1	10.1	3.0	2.9		

EXPERIMENT STATION BULLETIN.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Mixture.	Crude protein.	Crude fat.	Crude fibre.	Price per ton or cwt.	Principal ingredients identified.
American Milling Co., Peoria, Ill.—Con.								
B 3379	Cluck Chick Scratch Feed with 5 per cent grit.	Detroit..... G.* 12.6 F.* 9.8	10.0	2.6	5.0	3.65	Same as B 3339 with grit.	
B 3756	Surene Chick Feed.	Howell..... G.* 10.0 F.* 8.6	10.0	2.6	5.0	4.00	Wheat, corn, kafir, millet.	
B 3344	Surene Poultry Mash.	Detroit..... G.* 18.0 F.* 15.3	18.0	3.6	12.0	3.25	Lined seed meal, meat scraps, alfalfa meal, corn feed meal, wheat bran, dried buttermilk, calcium carbonate, salt.	
B 3373	Surene Poultry Mash.	Detroit..... G.* 10.5 F.* 4.7	10.5	5.0	6.6	4.00	Same as B 3344.	
	Average.....	10.5	18.2	4.9	6.0			
B 3340	Surene Scratch Feed	Detroit..... G.* 12.2 F.* 9.9	10.0	2.6	5.0	3.80	Wheat, oats, corn, kafir, buckwheat, barley, sunflower.	
B 3549	Surene Scratch Feed	Albion..... G.* 11.9 F.* 10.2	10.0	2.8	4.50	3.30	Same as B 3340.	
B 4442	Surene Scratch Feed	Monroe..... G.* 11.8 F.* 9.6	10.0	2.7	3.1	4.00	Same as B 3340 without buckwheat and sunflower.	
	Average.....	12.0	9.9	2.8				
B 3979	Tip Top Scratch Feed	Grand Rapids..... G.* 12.5 F.* 10.8	10.0	2.5	5.0	3.30	Wheat, oats, corn, kafir, wild buckwheat, barley, sunflower.	
B 4364	Tip Top Scratch Feed	Isippening..... G.* 12.8 F.* 9.8	10.0	3.3	2.9	3.35	Same as B 3979.	
	Average.....	12.7	10.4	3.6	2.9			
B 3338	Tip Top Scratch Feed with 5% grit.	Detroit..... G.* 11.5 F.* 9.4	10.0	2.6	5.0	3.50	Same as B 3979 with grit.	
B 4518	Tip Top Scratch Feed with 5% grit.	Escanaba..... G.* 12.6 F.* 10.5	10.0	3.7	4.0	3.20	Same as B 3979 with grit.	
	Average.....	12.1	10.0	3.4	3.2			
Academy Farms Milling Co., Chicago, Ill.								
B 4765	Academy Chick Feed	Jackson..... G.* 12.1 F.* 9.9	8.0	2.0	5.0	5.00	Wheat, oats, cracked corn, kafir, millet, charcoal, grit.	
B 4892	Academy Chick Feed	Wayne..... G.* 14.4 F.* 11.0	11.0	3.5	2.1	4.00	Same as B 4765 without grit and charcoal.	
	Average.....	13.3	10.5	3.3	2.4			
B 3790	Academy Poultry Feed	Hartford..... G.* 12.2 F.* 9.8	8.0	2.0	5.0	3.96	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.	
B 4191	Academy Poultry Feed	Adrian..... G.* 12.1 F.* 9.4	8.0	2.7	3.1	3.55	Same as B 3790.	
B 4892	Academy Poultry Feed	Wayne..... G.* 13.5 F.* 10.2	10.2	4.0	4.0	3.75	Same as B 3790.	
B 4905	Academy Poultry Feed	Wayne..... G.* 12.3 F.* 10.1	10.1	3.0	3.7	3.60	Same as B 3790 without oats.	
B 4937	Academy Poultry Feed	Birmingham..... G.* 11.6 F.* 10.2	10.2	3.1	3.3		Same as B 3790.	
	Average.....	12.3	10.1	3.2	3.7			

EXPERIMENT STATION BULLETIN.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 4190 B 4935	Blatchford Cat Meal Factory, Waukegan, Ill.—Con. Blatchford's Milk Mash. Blatchford's Milk Mash.	Adrian. Pontiac. Average.....	9.7 9.2 9.9	22.0 22.1 22.5	4.8 5.5 4.8	6.0 6.4 5.8	\$5.20 5.35	Same as B 3346. Same as B 3346.
B 4054	Brentfield & Colvin, Bay City, Mich. Pure Grain Scratch Feed	Bay City { G.* F.*	12.6	9.6	2.9	3.5	3.60	Wheat, oats, corn, kafir, milo, buckwheat, barley.
B 4072	Caro Farmers Cooperative Elevator Co., Caro, Mich. Caro Poultry Feed	Caro { G.* F.*	13.0	10.8	3.1	5.2	4.25	Wheat, oats, corn, buckwheat, barley.
B 3727	10Caughy Joasman Co., Detroit, Mich. CCC Scratch Feed	Detroit { G.* F.*	10.6	9.5	2.5	2.6	3.60	Wheat, oats, cracked corn, buckwheat, barley, grit.
B 4772	Common Sense Baby Chick Feed	Detroit { G.* F.*	11.2	9.8	4.0	3.0	5.00	Wheat, cracked corn, kafir, milo, millet, wild seed.
B 3372	Common Sense Developing Feed	Detroit { G.* F.*	10.8	9.8	2.1	2.5	3.80	Wheat, corn, kafir, buckwheat, milo, millet, peas.
B 3538	Common Sense Developing Feed	Detroit { G.* F.*	12.0	10.9	2.3	2.4	4.15	Wheat, oats, cracked corn, kafir, milo, buckwheat, barley, weed seeds.
B 3363	Common Sense Egg Mash	Average.....	11.4	9.9	2.2	2.5	.....	.....
B 3369 B 3734	Common Sense Pigeon Feed No. 4 Common Sense Pigeon Feed No. 4	Detroit { G.* F.* Detroit { G.* F.* Average.....	10.5 11.7 11.8	15.0 11.3 10.7	3.5 2.7 2.7	10.2 2.8 2.5	3.15 4.75 4.60	Corn feed meal, corn bran, wheat bran and middlings, oat middlings oat hulls, meat scraps, alfalfa meal. Wheat, cracked corn, kafir, buckwheat, millet, peas. Same as B 3369.
B 3337 B 3370 B 3735	Common Sense Pigeon Feed No. 5 Common Sense Pigeon Feed No. 5 Common Sense Pigeon Feed No. 5	Detroit { G.* F.* Detroit { G.* F.* Average.....	11.7 11.5 11.5	11.4 11.3 12.1	2.7 2.7 2.7	2.8 3.2 3.6	5.00 4.85 4.70	Wheat, corn, kafir, buckwheat, peas, millet. Same as B 3337. Same as B 3337.
B 3371 B 3390	Common Sense Pigeon Feed No. 6 Common Sense Pigeon Feed No. 6	Detroit { G.* F.* Detroit { G.* F.*	12.2 12.1	12.2 12.0	2.7 2.5	3.6 4.3	..... 4.95 4.95	Wheat, kafir, buckwheat, millet, peas. Same as B 3371.

B 3322	Common Sense Pigeon Feed No. 6.....	11.8	12.6	2.4	3.7	5.10	Same as B 3371.
B 3354	Common Sense Pigeon Feed No. 6.....	11.8	12.8	4.3	3.9	5.45	Same as B 3371 with barley and milo.
B 3321	Common Sense Pigeon Feed No. 6.....	11.4	13.7	2.6	2.6	5.50	Same as B 3371.
B 3736	Common Sense Pigeon Feed No. 6.....	11.9	11.5	2.5	3.4	4.80	Same as B 3371.
	Average.....	11.9	12.4	2.8	3.6		
B 3367	Common Sense Scratch Feed.....	G.*	9.6	2.6	2.6		Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.
B 3367	Common Sense Scratch Feed.....	{ F.*	11.8	11.1	2.6	3.7	Same as B 3367 without sunflower.
B 3347	Common Sense Scratch Feed.....		11.8	10.0	2.7	3.2	Same as B 3367.
B 3553	Common Sense Scratch Feed.....		11.8	9.8	3.0	4.2	Same as B 3367.
B 3580	Common Sense Scratch Feed.....		11.3	9.9	3.3	3.7	Same as B 3367 without oats and with peas.
B 3617	Common Sense Scratch Feed.....		12.1	10.6	2.7	4.0	Same as B 3367 without sunflower with peas.
B 3728	Common Sense Scratch Feed.....		11.3	10.8	3.3	3.2	Same as B 3367 without wheat and sunflower.
B 3732	Common Sense Scratch Feed.....		11.3	10.2	2.9	3.6	Same as B 3367 with milo.
	Average.....	12.1	9.8	3.1	3.5	3.45	
B 3368	Common Sense Scratch Feed No. 2.....	11.7	10.3	3.0	3.6		Wheat, cracked corn, kafir, buckwheat, barley, sunflower, shell, grit.
B 3647	Common Sense Scratch Feed No. 2.....	G.*	9.7	3.6	3.3		Wheat, oats, corn, kafir, buckwheat, barley, grit.
B 3733	Common Sense Scratch Feed No. 2.....	{ F.*	11.2	10.2	2.2	3.3	Same as B 3647.
	Average.....	11.5	9.8	2.8	3.5	3.45	
B 4510	Cereal Mills Co., Wausau, Wis. Cemco Hen Feed.....	11.0	9.9	2.4	3.4		Wheat, oats, corn, kafir, buckwheat, barley, sunflower, grit.
B 4622	F. B. Chamberlain Co., St. Louis, Mo. Chamberlain's Perfect Chick Feed.....	G.*	10.0	2.6	6.0		Wheat, oatmeal, kafir, milo, meat scraps, grain screenings, weed seeds, charcoal, grit.
B 4640	Chamberlain's Perfect Chick Feed.....	{ F.*	10.1	14.6	3.9	5.3	Same as B 4622.
	Average.....	10.4	14.8	4.2	5.2	7.00	
B 4657	Chatfield Milling & Grain Co., Bay City, Mich. Plymouth Rock Scratch Feed.....	10.3	14.7	4.1	5.3		Wheat, oats, corn, buckwheat, barley, sunflower, grit.
B 4667	Plymouth Rock Scratch Feed.....	G.*	10.0	2.6	7.0		Same as B 4657 with screenings.
	Average.....	{ F.*	11.1	10.2	3.6	4.0	
B 3384	Commercial Milling Co., Detroit, Mich. Henkel's Poultry Feed.....	11.7	10.0	3.4	5.1		Wheat, cracked corn, buckwheat, kafir, milo, hemp, screenings, grit.
B 3391	Henkel's Poultry Feed.....	G.*	9.0	2.4	4.0		Same as B 3384 without kafir and hemp.
B 3395	Henkel's Poultry Feed.....	{ F.*	11.0	9.3	3.1	2.6	Same as B 3384 without hemp.
B 3451	Henkel's Poultry Feed.....		10.8	9.2	3.5	3.2	Same as B 3395.
B 3451	Henkel's Poultry Feed.....		10.6	9.1	3.8	3.1	Same as B 3391.
B 3738	Henkel's Poultry Feed.....		10.1	9.1	3.9	3.1	Same as B 3505.
B 4317	Henkel's Poultry Feed.....		10.1	9.1	3.9	3.1	Same as B 3505 with sunflower.
	Average.....	11.5	10.0	4.0	3.0	3.90	
	Average.....	10.9	9.3	3.6	3.0		

*The brands listed below were licensed by the Fumabells Co. whose business has been taken over by this company.

*Abbreviations for Guaranteed and Found.

B 3380	Globe Egg Mash.....	{ G.* F.* }	11.1	15.0	5.0	10.0	3.65	Lined cake, meat scrap, alfalfa meal, wheat bran and middlings, corn feed meal, corn bran, salt.
B 3386	Globe Egg Mash.....	{ G.* F.* }	11.1	16.6	4.6	7.4	3.60	Same as B 3380.
B 3499	Globe Egg Mash.....	{ G.* F.* }	11.1	18.9	3.8	7.1	3.60	Same as B 3380.
B 3544	Globe Egg Mash.....	{ G.* F.* }	10.4	22.1	4.5	6.3	3.75	Same as B 3380.
B 3560	Globe Egg Mash.....	{ G.* F.* }	10.5	21.9	5.3	2.8	3.37	Same as B 3380.
B 3571	Globe Egg Mash.....	{ G.* F.* }	10.6	22.2	4.7	7.3	3.80	Same as B 3380.
B 3579	Globe Egg Mash.....	{ G.* F.* }	10.4	20.9	4.5	7.0	4.00	Same as B 3380.
B 3635	Globe Egg Mash.....	{ G.* F.* }	9.5	20.7	4.9	7.4	3.30	Same as B 3380.
B 3659	Globe Egg Mash.....	{ G.* F.* }	10.5	19.9	5.0	7.8	3.50	Same as B 3380.
	Average.....		10.6	20.6	4.5	6.7		
B 3541	Globe Pigeon Feed no grit.....	{ G.* F.* }	11.2	12.0	2.5	6.0	5.60	Wheat, kafir, buckwheat, peas, millet, hemp.
B 3730	Globe Pigeon Feed no grit.....	{ G.* F.* }	11.0	13.0	3.3	4.2	5.35	Same as B 3541.
B 4720	Globe Pigeon Feed no grit.....	{ G.* F.* }	10.8	13.8	3.5	4.8	4.80	Same as B 3541.
	Average.....		11.0	12.9	3.3	4.5		
B 3378	Globe Scratch Feed no grit.....	{ G.* F.* }	12.0	10.5	2.5	6.0	4.50	Lined cake, wheat, oats, corn, kafir, buckwheat, barley, sunflower, wild buckwheat.
B 3536	Globe Scratch Feed no grit.....	{ G.* F.* }	12.2	10.4	2.7	3.2	4.05	Same as B 3378 without wild buckwheat.
B 3542	Globe Scratch Feed no grit.....	{ G.* F.* }	11.4	10.4	3.9	3.3	3.95	Same as B 3536.
B 3597	Globe Scratch Feed no grit.....	{ G.* F.* }	11.5	11.0	3.0	3.4	5.00	Same as B 3536 with milo.
B 3808	Globe Scratch Feed no grit.....	{ G.* F.* }	11.9	10.6	3.0	3.3	4.20	Same as B 3536.
B 3850	Globe Scratch Feed no grit.....	{ G.* F.* }	12.4	10.3	2.7	2.9	4.00	Same as B 3536.
B 3860	Globe Scratch Feed no grit.....	{ G.* F.* }	12.1	10.6	2.6	3.0	3.50	Same as B 3536.
B 3886	Globe Scratch Feed no grit.....	{ G.* F.* }	11.8	10.4	2.8	3.2	3.95	Same as B 3536.
B 4359	Globe Scratch Feed no grit.....	{ G.* F.* }	11.9	11.0	2.9	3.0	4.00	Same as B 3536.
	Average.....		11.9	10.6	2.9	3.1		
B 3805	Globe Scratch Feed with grit.....	{ G.* F.* }	11.5	9.9	3.1	3.4	3.50	Same as B 3536 with grit.
B 3885	Globe Scratch Feed with grit.....	{ G.* F.* }	11.0	11.1	2.3	3.1	3.80	Same as B 3805.
B 4329	Globe Scratch Feed with grit.....	{ G.* F.* }	12.1	10.3	2.8	3.8	3.85	Same as B 3805.
	Average.....		11.5	10.4	2.9	3.4		
B 3355	King Pigeon Feed no grit.....	{ G.* F.* }	10.4	10.9	3.4	3.9	4.50	Wheat, corn, kafir, buckwheat, millet, peas, hemp.
B 4719	King Pigeon Feed no grit.....	{ G.* F.* }	11.3	10.8	3.4	3.6	3.90	Same as B 3355.
	Average.....		10.9	10.9	3.4	3.8		
B 3757	Fine Tree Chick Feed no grit.....	{ G.* F.* }	12.0	9.5	2.3	1.6	4.50	Wheat, corn, kafir, millet.
B 4598	Fine Tree Chick Feed with grit.....	{ G.* F.* }	9.9	10.4	2.5	1.8	3.60	Same as B 3757 with grit.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Albert Dickinson Co., Chicago, Ill.—Con.								
B 3890	Pine Tree Scratch Feed no grit.	{ G.* P.* Muskegon..... Onaway..... Pietavon..... Jackson..... Average.....	10.0	10.0	4.5	5.0	Wheat, oats, corn, kafir, buckwheat, barley, sunflower. Same as B 3890. Same as B 3890. Same as B 3890. Same as B 3890 without sunflower.
B 4317	Pine Tree Scratch Feed no grit.		11.3	10.4	3.4	3.6	\$3.90	
B 4309	Pine Tree Scratch Feed no grit.		12.3	10.0	2.9	3.8	4.00	
B 4307	Pine Tree Scratch Feed no grit.		11.7	10.5	3.3	3.6	3.50	
B 4763	Pine Tree Scratch Feed no grit.		12.9	10.1	3.5	3.8	.....
B 3876	Pine Tree Scratch Feed with grit.	{ G.* P.* Grand Rapids..... Muskegon..... Manistique..... Average.....	12.1	10.3	3.3	3.7	Same as B 3890 with grit. Same as B 3876. Same as B 3876. Same as B 3876. Alfalfa meal, wheat, wheat bran and middlings, corn feed meal, corn bran, meat scraps.
B 3881	Pine Tree Scratch Feed with grit.		11.0	10.0	2.5	5.0	3.57	
B 4343	Pine Tree Scratch Feed with grit.		10.7	9.7	3.1	3.1	3.75	
B 4334	Pine Tree Scratch Feed with grit.		11.3	11.0	2.9	2.8	3.50	
B 4350	Queen Poultry Mash		11.0	10.1	2.9	3.0	.....
B 3877	Rival Scratch Feed no grit.	{ G.* P.* Marquette..... Grand Rapids..... Detroit..... Average.....	11.0	11.0	4.5	10.0	3.10	Wheat, oats, corn, kafir, wild buckwheat, barley. Same as B 3877 with weed seeds.
B 4723	Rival Scratch Feed no grit.		10.6	12.3	4.3	8.1	3.57	
B 3875	Rival Scratch Feed with grit.		9.5	9.5	3.5	4.4	3.40	
B 4051	Rival Scratch Feed with grit.		11.3	11.6	4.1	5.6	.....
B 4343	Rival Scratch Feed with grit.		10.8	11.7	3.8	5.0	.....
B 4854	Rival Scratch Feed with grit.	{ G.* P.* Grand Rapids..... Saginaw..... Munising..... Manistee..... Average.....	9.5	9.5	2.5	5.0	Same as B 3877 with grit. Same as B 3875. Same as B 3875 with screenings. Same as B 3875 with weed seeds. Same as B 3875 with weed seeds.
B 3875	Rival Scratch Feed with grit.		10.7	10.5	3.1	4.3	3.42	
B 4051	Rival Scratch Feed with grit.		10.1	10.5	3.0	4.0	3.35	
B 4343	Rival Scratch Feed with grit.		9.5	10.2	3.1	3.5	3.75	
B 4854	Rival Scratch Feed with grit.		10.9	11.3	3.4	4.1	3.50	
B 4047	White Cross Chick Feed with grit.	{ G.* P.* Saginaw..... Marquette..... Manistique..... Plymouth..... Average.....	10.3	10.6	3.2	4.0	Wheat, corn, kafir, millet, grit. Same as B 4047 with wild buckwheat. Same as B 4047. Same as B 4047. Same as B 4047.
B 4352	White Cross Chick Feed with grit.		10.0	10.0	4.5	5.0	3.75	
B 4636	White Cross Chick Feed with grit.		10.3	9.2	2.2	1.4	4.00	
B 4636	White Cross Chick Feed with grit.		11.1	12.3	2.8	3.0	3.70	
B 4898	White Cross Chick Feed with grit.		11.7	10.9	3.5	3.1	4.25	
B 3172	White Cross Scratch Feed no grit.	{ G.* P.* Grand Rapids..... Detroit..... Detroit.....	11.1	10.8	2.7	2.6	Wheat, oats, corn, kafir, buckwheat, barley, sunflower. Same as B 3172. Same as B 3172.
B 8018	White Cross Scratch Feed no grit.		11.0	10.3	2.9	3.9	3.80	
B 3048	White Cross Scratch Feed no grit.		12.1	10.3	2.9	3.0	3.90	

B 3701	White Cross Scratch Feed no grit.	11.8	10.4	3.1	3.4	3.90	Same as B 3172.
B 3702	White Cross Scratch Feed no grit.	12.2	10.1	2.7	3.3	3.90	Same as B 3172.
B 3725	White Cross Scratch Feed no grit.	11.0	10.2	2.8	3.4	3.80	Same as B 3172.
	Average	11.6	10.3	2.9	3.3		
		{ G.*	10.0	2.5	5.0		
B 3572	White Cross Scratch Feed with grit.	{ F.*	9.3	2.5	2.7	4.00	Same as B 3172 with grit.
	Dodge Hooker Mills, Wausau, Wis.						
B 4321	Wisconsin Poultry Ration.	{ G.*	10.0	2.5	5.0		Wheat, oats, corn, kaffir, milo, buckwheat, barley, linseed cake, sunflower.
		{ F.*	11.5	3.2	3.4	4.25	
B 4179	O. Gandy & Co., South Whitley, Ind.						
	Standard A Poultry Feed	{ G.*	9.5	2.5	5.0		Wheat, oats, corn, kaffir, buckwheat, barley, millet, sunflower.
		{ F.*	12.1	3.1	2.7	4.25	
	Hales & Edwards Co., Chicago, Ill.						
B 4289	Cackle Fine Chick Feed no grit.	(1918) { G.*	9.0	2.0	7.0		Cracked wheat, cracked corn, cracked kaffir, millet.
		(1919) { F.*	11.1	2.4	1.8	3.50	
B 4613	Cackle Fine Chick Feed no grit.	{ G.*	10.0	2.5	5.0		Same as B 4289.
B 4759	Cackle Fine Chick Feed no grit.	{ F.*	11.5	2.9	1.7	3.60	Same as B 4289.
			12.2	2.2	1.6		
	Average		12.1	10.2	2.6	1.7	
B 3683	Cackle Fine Chick Feed with grit.	{ G.*	9.0	2.0	7.0		Same as B 4289 with grit and weed seeds.
		{ F.*	11.3	10.4	2.6	1.7	4.00
B 3428	Cackle Poultry Feed no grit.	{ G.*	9.0	2.0	7.0		Wheat, oats, cracked corn, kaffir, barley, sunflower.
B 3474	Cackle Poultry Feed no grit.	{ F.*	12.5	10.2	2.3	2.9	
B 3637	Cackle Poultry Feed no grit.		12.0	10.4	2.8	3.80	Same as B 3428.
B 3679	Cackle Poultry Feed no grit.		11.7	10.4	2.7	3.45	Same as B 3428.
B 4574	Cackle Poultry Feed no grit.		12.6	9.3	3.0	3.85	Same as B 3428.
			11.5	11.4	3.5	3.50	Same as B 3428.
	Average		12.1	10.3	2.8	3.1	
B 4630	College Scratch Feed.	{ G.*	10.0	2.5	5.0		Wheat, oats, cracked corn, kaffir, buckwheat, barley.
B 3405	Morning Glory Scratch Feed no grit.	{ F.*	11.5	10.8	3.3	2.3	Wheat, oats, cracked corn, kaffir, wild buckwheat, barley, sunflower.
B 3473	Morning Glory Scratch Feed no grit.	{ G.*	9.0	2.0	7.0		Same as B 3408 with weed seeds.
B 3530	Morning Glory Scratch Feed no grit.	{ F.*	12.6	10.7	2.9	3.3	Same as B 3408.
B 3640	Morning Glory Scratch Feed no grit.		11.5	11.3	2.9	3.1	Same as B 3408 with weed seeds.
B 3692	Morning Glory Scratch Feed no grit.		11.6	11.6	2.4	4.1	Same as B 3408 with weed seeds and grit.
			12.1	10.9	3.1	3.85	
	Average		12.1	9.6	2.7	3.1	
			11.9	10.8	2.8	3.4	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Hales & Edwards Co., Chicago, Ill.—Con.								
B 3604	Morning Glory Scratch Feed with grit and shell.	{ G.* F.*	9.6	9.0	2.0	7.0	4.50	Wheat, oats, cracked corn, kafir, wild buckwheat, barley, sunflower, weed seeds, grit, shell.
B 4382	Morning Glory Scratch Feed with grit and shell.	Marshall	11.6	10.1	6.0	7.3	3.20	Same as B 3604 without weed seeds.
B 4372	Morning Glory Scratch Feed with grit and shell.	Hancock	11.9	10.5	3.0	3.8	3.75	Same as B 3604 without weed seeds.
		Ludington	12.6	12.6	2.8	3.3		
		Average	11.0	11.1	3.9	4.8		
B 3523	Pound Squab Pigeon Feed no grit.	{ G.* F.*	12.1	9.0	2.0	7.0	4.25	Wheat, cracked corn, kafir, buckwheat, pea, millet, hemp.
B 3577	Pound Squab Pigeon Feed no grit.	Detroit	11.3	11.4	2.7	2.8	4.50	Same as B 3523.
B 3641	Pound Squab Pigeon Feed no grit.	Detroit	12.2	11.0	3.0	3.0	4.25	Same as B 3523 without corn.
B 3684	Pound Squab Pigeon Feed no grit.	Detroit	12.4	11.6	3.4	3.6	4.25	Same as B 3523.
		Lansing	12.2	10.6	2.7	2.4	4.25	Same as B 3523.
		Average	12.0	11.2	3.0	3.0		
B 3524	Red Comb Coarse Chick Feed no grit.	{ G.* F.*	11.2	9.0	2.0	7.0	3.96	Wheat, cracked corn, kafir, hulled oats, millet, grit.
B 3685	Red Comb Coarse Chick Feed no grit.	Detroit	11.6	9.9	2.5	1.9	4.10	Same as B 3524.
B 4581	Red Comb Coarse Chick Feed no grit.	Lansing	12.5	8.9	2.4	1.6	3.50	Same as B 3524 without grit.
B 4614	Red Comb Coarse Chick Feed no grit.	Charlevoix	12.1	10.4	2.8	1.8	3.60	Same as B 3524.
		Grand Rapids	11.9	11.3	3.0	2.0		
		Average	11.9	10.1	2.7	1.8		
B 4629	Red Comb Fine Chick Feed no grit.	{ G.* F.*	13.3	10.0	2.6	6.0	4.00	Cracked wheat, cracked corn, steel cut oats, millet, kafir.
B 4770	Red Comb Fine Chick Feed no grit.	Detroit	11.0	9.9	2.6	1.9	5.50	Same as B 4629 with weed seeds.
		Average	12.2	9.9	2.7	1.8		
B 3636	Red Comb Crude Fatener with dried buttermilk.	{ G.* F.*	10.1	15.0	4.0	8.0	4.00	Alfalfa meal, wheat middlings, oat flour, barley flour, red dog flour, corn feed meal, dried buttermilk, meat scraps.
B 3809	Red Comb Crude Fatener with dried buttermilk.	Detroit	11.4	13.7	5.8	5.2	4.45	Same as B 3636 without meat scraps.
		Holland	11.1	11.1	3.9	3.9		
		Average	10.8	12.4	4.4	4.1		
B 2410	Red Comb Mash Feed with dried buttermilk and shell.	{ G.* F.*	10.3	15.0	4.0	10.0	3.00	Linseed meal, alfalfa meal, wheat bran, ground oats, corn feed meal, meat scraps, dried buttermilk, salt, grit, shell.
B 2521	Red Comb Mash Feed with dried buttermilk and shell.	Detroit	9.8	13.9	4.7	7.9	3.00	Same as B 2410 with middlings and without salt.
B 2642	Red Comb Mash Feed with dried buttermilk and shell.	Detroit	9.9	17.8	4.7	6.7	3.00	Same as B 2521 without grit.
B 2690	Red Comb Mash Feed with dried buttermilk and shell.	Detroit	10.7	17.4	5.2	6.3	3.00	Same as B 2521 without grit.
B 2690	Red Comb Mash Feed with dried buttermilk and shell.	Lansing	10.7	16.4	4.3	6.3	3.00	Same as B 2521 without grit.
B 2812	Red Comb Mash Feed with dried buttermilk and shell.	Holland	13.0	14.4	3.2	8.9	3.75	Same as B 2521 without grit.

B 4584	Red Comb Mash Feed with dried buttermilk and shell.	Charlevoix.....	Average.....	9.4	17.2	4.6	7.4	3.75	Same as B 3521 without grit.
		(1918) { G* F.*		10.5	17.2	4.5	7.4		
B 3376	Red Comb Poultry Feed no grit.....	Detroit.....	G* 9.0	10.8	10.6	2.8	3.5	3.95	Wheat, oats, corn, kafir, buckwheat, barley, sunflower.
B 3377	Red Comb Poultry Feed no grit.....	Detroit.....	G* 12.6	12.2	2.4	3.4	4.25	4.25	Same as B 3376 with grit.
B 3383	Red Comb Poultry Feed no grit.....	Detroit.....	G* 12.3	11.1	2.2	3.0	2.5	3.90	Same as B 3376.
B 3409	Red Comb Poultry Feed no grit.....	Grand Rapids.....	G* 12.6	10.7	2.7	2.5	2.5	3.90	Same as B 3376.
B 3454	Red Comb Poultry Feed no grit.....	Forest Grove.....	G* 12.6	9.8	3.5	2.7	3.0	3.90	Same as B 3376.
B 3529	Red Comb Poultry Feed no grit.....	Detroit.....	G* 12.2	11.3	2.6	3.0	3.0	3.60	Same as B 3376.
B 3535	Red Comb Poultry Feed no grit.....	Detroit.....	G* 12.6	9.9	2.7	3.3	3.4	4.05	Same as B 3376 with milo.
B 3563	Red Comb Poultry Feed no grit.....	Detroit.....	G* 11.8	10.1	3.1	3.4	4.00	4.00	Same as B 3376.
B 3594	Red Comb Poultry Feed no grit.....	Albion.....	G* 11.9	10.4	2.9	3.3	3.3	4.85	Same as B 3376.
B 3653	Red Comb Poultry Feed no grit.....	Detroit.....	G* 12.5	9.8	2.7	2.8	2.8	4.25	Same as B 3376.
B 3681	Red Comb Poultry Feed no grit.....	Lansing.....	G* 12.8	9.2	2.8	3.0	3.0	3.90	Same as B 3376.
		Average.....		12.2	10.5	2.8	3.1		
B 4582	Red Comb Poultry Feed no grit.....	(1919) { G* F.*		10.0	10.4	2.8	5.0		Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.
B 3513	Red Comb Poultry Feed with grit.....	Charlevoix.....	G* 9.0	12.0	10.4	2.3	3.3	3.50	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower, grit.
B 3549	Red Comb Poultry Feed with grit.....	Detroit.....	F* 11.5	10.1	3.0	3.1	3.1	3.90	Same as B 3513 with milo.
		Average.....		11.8	10.3	2.7	3.2		
B 3907	Harris Milling Co., Mt. Pleasant, Mich. Scratch Feed.....	Mt. Pleasant.....	G* 11.5	10.0	10.6	2.5	5.0	3.20	Oats, cracked corn, buckwheat, barley, wheat screenings, sunflower.
	B. B. Hyde, Port Huron, Mich. Ideal Poultry Food.....	Port Huron.....	G* 11.4	9.8	10.7	2.8	4.6	4.00	Wheat, oats, cracked corn, kafir, buckwheat, barley, charcoal.
B 4900	Ithaca Roller Mills, Ithaca, Mich. Renown Poultry Feed.....	Ithaca.....	G* 11.4	11.4	11.3	2.7	4.6		Oats, cracked corn, kafir, buckwheat, barley, wheat screenings.
B 3902	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Laying Mash.....	Zeeland.....	G* 9.8	18.0	17.8	5.0	9.6	3.60	Hominy feed, meat scraps, alfalfa meal, wheat bran and middlings, red dog flour, corn germ meal, corn feed meal.
B 4605	Blue Top Scratch Feed no grit.....	Mt. Clemens.....	G* 13.8	10.4	2.4	3.3	3.3	3.75	Wheat, oats, corn, kafir, buckwheat, barley, sunflower.
B 4974	Conservation Chick Feed no grit.....	Coopersville.....	G* 12.0	10.4	3.3	2.8	2.8	4.00	Wheat, cracked corn, kafir, milo, millet.
B 4824	Conservation Chick Feed no grit.....	Mt. Clemens.....	F* 13.9	10.5	3.0	2.5	2.5	4.00	Same as B 4624.
B 4977		Average.....		12.5	10.5	3.2	2.7		
B 4976	Conservation Developing Feed no grit.....	Mt. Clemens.....	G* 14.1	9.0	10.1	3.4	5.1	4.00	Cracked corn, kafir, milo, buckwheat, millet.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number	Manufacturer and Trade Name	Sampled at	Moisture	Crude protein	Crude fat	Crude fiber	Price per ton or cwt.	Principal ingredients identified.
	Chas. A. Kruse Milling Co., Milwaukee, Wis.—Con.	(1918) { G.* F.*						
B 3517	Conservation Scratch Feed no grit.	Detroit.....	12.0	10.0	8.6	6.0	\$4.00	Oats, corn, kafir, buckwheat, barley, sunflower.
B 3523	Conservation Scratch Feed no grit.	(1919) { G.* F.*	9.0	10.4	3.1	3.2	3.70	Same as B 3517.
B 4559	Conservation Scratch Feed no grit.	Holland.....	11.2	9.6	3.1	3.5	3.50	Same as B 3517.
		Manitowish.....	11.3	9.6	3.1	3.4		
		Average.....	11.3	9.6	3.1	3.5		
B 3192	Conservation Scratch Feed with grit.	(1918) { G.* F.*						Same as B 3517 with grit.
B 3680	Conservation Scratch Feed with grit.	Grand Rapids.....	12.1	10.0	8.6	6.0		Same as B 3517 with grit.
B 3742	Conservation Scratch Feed with grit.	(1919) { G.* F.*	10.8	9.0	8.6	6.0	3.65	Same as B 3517 with grit.
		Lansing.....	10.8	9.1	2.4	3.5	4.25	Same as B 3517 with grit.
		Mason.....	10.7	9.4	2.9	3.8		
		Average.....	10.8	9.3	2.7	3.7		
B 3432	Kruse Scratch Feed no grit.	(1918) { G.* F.*						Wheat, oats, corn, kafir, buckwheat, barley, sunflower.
B 3451	Kruse Scratch Feed no grit.	Grand Haven.....	11.9	10.0	8.6	6.0	3.90	Same as B 3432 with weed seeds.
B 3583	Kruse Scratch Feed no grit.	Zeeland.....	12.6	11.4	2.9	4.5	4.00	Same as B 3432.
B 3651	Kruse Scratch Feed no grit.	Muskegon.....	11.1	10.0	3.0	3.6		Same as B 3432 with milo.
B 4604	Kruse Scratch Feed no grit.	Belding.....	11.7	9.9	3.0	3.2	3.60	Same as B 3432.
B 4840	Kruse Scratch Feed no grit.	Zeeland.....	12.4	10.6	2.5	3.1	3.70	Same as B 3432.
		Traverse City.....	12.8	10.0	3.2	3.0		
		Average.....	12.1	10.3	2.8	3.4		
B 3431	Kruse Scratch Feed with grit.	(1918) { G.* F.*						Same as B 3432 with milo and grit.
	Larrows Milling Co., Detroit, Mich.	Grand Haven.....	11.4	8.9	8.5	6.0	3.80	
B 4477	Log Cabin Scratch Feed	(1919) { G.* F.*						Wheat, cracked corn, kafir, buckwheat, barley, sunflower.
B 4590	Log Cabin Scratch Feed	Holly.....	12.1	10.8	8.5	6.0	4.00	Same as B 4477 with milo.
B 4665	Log Cabin Scratch Feed	Waukegan.....	13.9	10.3	3.4	3.1	3.80	Same as B 4477 with milo.
		Mt. Clemens.....	11.7	9.8	3.0	3.0		
		Average.....	12.6	10.2	3.2	3.3		
B 4780	Crest Brand Poultry Feed.	(1918) { G.* F.*						Wheat, oats, corn, kafir, milo, buckwheat, barley.
	McMoran Milling Co., Port Huron, Mich.	Port Huron.....	10.4	10.8	8.0	5.0	3.90	
B 4416	Mimco Scratch Feed.	(1919) { G.* F.*						Wheat, oats, corn, buckwheat, screenings.
	Michigan Milling Co., Ann Arbor, Mich.	Ann Arbor.....	18.7	12.6	8.8	4.8	2.90	

COMMERCIAL FEEDING STUFFS.

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•Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fibre.	Price per ton or cwt.	Principal ingredients identified.
Park & Pollard Co., Chicago, Ill.—Con.								
B 3357	Growing Feed	Detroit (G.* { F.*	9.8	10.0	1.5	8.0	\$3.80	Wheat, oats, ground corn, kafir, barley, buckwheat, wheat bran and middlings, alfalfa meal, meat, bone, calcium carbonate, salt.
B 3419	Growing Feed	Grand Rapids	10.7	14.1	3.2	7.4	3.85	Same as B 3357.
B 3672	Growing Feed	Lansing	10.7	15.8	3.2	6.4	4.00	Same as B 3357 without alfalfa meal.
B 3834	Growing Feed	Holland	11.1	16.6	3.2	5.5	3.75	Same as B 3357 without alfalfa meal.
B 4836	Growing Feed	Traverse City	10.6	12.4	3.6	6.2	3.85	Same as B 3357.
	Average		10.6	14.3	3.2	6.2		
B 4592	Intermediate Chick Feed	East Jordan (G.* { F.*	12.6	10.0	1.5	5.0	4.50	Wheat, oats, cracked corn, kafir, milo, buckwheat, millet.
B 4607	Intermediate Chick Feed	Kalamazoo	13.4	9.8	3.7	2.3	3.75	Same as B 4592.
B 4639	Intermediate Chick Feed	Grand Rapids	12.7	10.2	3.2	2.5	3.75	Same as B 4592.
	Average		12.9	10.0	3.4	2.7		
B 3356	Lay or Bust Dry Mash	Detroit (G.* { F.*	9.4	18.0	1.5	12.0	3.70	Meat, bone, alfalfa meal, wheat bran and middlings, oats, corn, kafir, buckwheat, barley, fish, calcium carbonate, salt.
B 3418	Lay or Bust Dry Mash	Grand Rapids	8.9	19.6	2.8	10.7	3.85	Alfalfa meal, salt, glass calcium carbonate.
B 3468	Lay or Bust Dry Mash	Zeeland	10.7	18.4	3.8	8.5	3.75	Same as B 3356 with wheat without oats.
B 3599	Lay or Bust Dry Mash	Albion	9.1	18.3	3.5	9.6	4.50	Same as B 3356 with wheat.
B 3671	Lay or Bust Dry Mash	Lansing	9.4	19.2	4.6	8.9	4.00	Same as B 3356 with wheat.
B 3835	Lay or Bust Dry Mash	Holland	10.4	18.3	4.5	7.2	3.65	Same as B 3356 with wheat.
B 3937	Lay or Bust Dry Mash	Holland	9.7	19.9	3.0	10.2	3.90	Same as B 3356 with wheat.
B 4044	Lay or Bust Dry Mash	Saginaw	8.7	17.9	4.2	10.2	4.00	Same as B 3356 with wheat and dried beet pulp.
B 4294	Lay or Bust Dry Mash	Grand Rapids	9.9	22.2	4.7	9.1	3.75	Same as B 3356 without buckwheat.
B 4591	Lay or Bust Dry Mash	East Jordan	9.6	18.9	4.7	7.4	3.50	Same as B 3356 with wheat, without meat scraps.
	Average		9.5	18.7	4.0	9.0		
B 3187	Pontiac Scratch Feed	Lawrence (G.* { F.*	11.2	10.0	1.5	5.0	4.00	Wheat, oats, cracked corn, kafir, milo, buckwheat, barley.
B 3353	Pontiac Scratch Feed	Detroit	11.1	9.9	3.2	4.0	3.85	Same as B 3187.
B 3469	Pontiac Scratch Feed	Zeeland	12.5	10.1	2.8	3.8	3.75	Same as B 3187.
B 4221	Pontiac Scratch Feed	Benton Harbor	12.5	9.9	2.9	3.9	3.90	Same as B 3187.
B 4412	Pontiac Scratch Feed	Ann Arbor	12.3	10.5	2.0	3.1	4.00	Same as B 3187.
B 4590	Pontiac Scratch Feed	East Jordan	12.4	10.3	3.2	2.9	3.75	Same as B 3187.
	Average		12.2	10.2	3.1	3.7		

B 3607	Red Ribbon Chick Feed	Marshall	{ G* F* }	10.0 11.9	2.9 2.9	5.0 5.0	Wheat, oats, cracked corn, kafir, milo, millet.
B 4293	Red Ribbon Chick Feed	Grand Rapids	{ G* F* }	10.3 11.5	2.0 3.5	5.00 2.1	Same as B 3607.
B 4837	Red Ribbon Chick Feed	Grand Rapids	{ G* F* }	10.6 12.2	3.9 2.2	5.00 2.2	Same as B 3607.
B 4766	Red Ribbon Chick Feed	Jackson	{ G* F* }	10.6 13.0	3.0 3.0	5.00 1.9	Same as B 3607.
	Average			12.2	3.3	2.1	
B 3666	Red Ribbon Scratch Feed	Laurens	{ G* F* }	10.0 12.0	1.5 3.3	5.0 3.6	Wheat, oats, cracked corn, kafir, milo, buckwheat, barley, sunflower.
B 3417	Screened Scratch Feed	Grand Rapids	{ G* F* }	10.0 11.0	1.5 2.6	4.00 3.2	Wheat, oats, cracked corn, kafir, buckwheat, barley, milo, sunflower.
B 3596	Screened Scratch Feed	Albion	{ G* F* }	10.3 11.7	3.3 3.4	3.85 4.1	Same as B 3417.
B 3836	Screened Scratch Feed	Holland	{ G* F* }	9.6 11.5	3.1 3.5	5.00 3.70	Same as B 3417.
B 4295	Screened Scratch Feed	Grand Rapids	{ G* F* }	10.3 12.1	3.4 3.6	3.50 3.6	Same as B 3417.
B 4569	Screened Scratch Feed	Charlevoix	{ G* F* }	10.1 11.1	2.8 3.1	3.50 3.7	Same as B 3417.
	Average			11.5	3.0	3.6	
B 4723	Peters' Red Feather Scratch Poultry Feed	Wyandotte	{ G* F* }	10.0 11.2	3.0 3.3	6.0 2.8	Wheat, cracked corn, kafir, milo, buckwheat, barley, sunflower.
B 4263	Chicken Feed	Postum Cereal Co., Battle Creek, Mich.	{ G* F* }	8.0 10.9	1.0 2.3	15.0 5.1	Wheat, oats, corn, screenings.
B 3677	Pratt's Baby Chick Feed	Pratt Food Co., Philadelphia, Pa.	{ G* F* }	11.5 10.4	3.5 4.0	3.8 3.4	Wheat middlings, oat shorts, corn meal, millet, rape, bone meal, soluble starch, Epsom salts, calcium carbonate.
	Purina Mills, Ralston Purina Co., St. Louis, Mo.						
B 3924	Purina Chicken Chowder Feed with charcoal	Grand Rapids	{ G* F* }	19.0 20.2	4.0 4.1	9.0 9.4	Linsed meal, gluten meal, meat scrap, blood meal, alfalfa meal, wheat bran and middlings, corn feed meal, charcoal, salt.
B 4025	Purina Chicken Chowder Feed with charcoal	Jonesville	{ G* F* }	19.1 21.0	4.6 9.0	4.00 4.00	Same as B 3924, without gluten meal, and blood flour.
B 4138	Purina Chicken Chowder Feed with charcoal	Croswell	{ G* F* }	19.6 20.1	3.4 9.1	3.75 3.90	Same as B 4025.
B 4145	Purina Chicken Chowder Feed with charcoal	Brown City	{ G* F* }	19.1 20.0	4.9 8.8	3.80 3.90	Same as B 4025.
B 4888	Purina Chicken Chowder Feed with charcoal	Almont	{ G* F* }	18.8 19.1	5.5 10.0	4.40 4.40	Same as B 4025.
	Average			9.9	4.5	9.3	
B 3927	Purina Chicken Fatena	Grand Rapids	{ G* F* }	9.0 10.4	5.0 7.4	9.0 7.6	Linsed meal, wheat middlings, corn germ meal, ground oats, ground corn, ground kafir, ground sunflower.
B 4303	Purina Chick Feed	Gladwin	{ G* F* }	10.0 11.2	4.0 2.9	4.0 2.2	Wheat, corn, kafir, millet.
B 3446	Purina Scratch Feed	(1918)	{ G* F* }	10.0 12.9	4.0 10.6	4.0 2.9	Wheat, oats, corn, kafir, milo, buckwheat, barley, sunflower.
B 3546	Purina Scratch Feed	Detroit	{ G* F* }	10.6 11.8	3.2 2.8	4.20 2.9	Same as B 3446.
B 3797	Purina Scratch Feed	Harford	{ G* F* }	10.1 11.8	3.0 3.1	4.25 2.8	Same as B 3446.
B 4009	Purina Scratch Feed	Three Rivers	{ G* F* }	10.7 12.0	3.0 3.0	4.50 3.0	Same as B 3446.
B 4009	Purina Scratch Feed	Union City	{ G* F* }	10.4 11.5	3.0 3.1	5.00 3.1	Same as B 3446.
B 4153	Purina Scratch Feed	Croswell	{ G* F* }	10.1 12.0	2.8 3.6	4.25 3.6	Same as B 3446.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fiber.	Crude fat.	Price per ton per cwt.	Principal ingredients identified.
B 4144 B 4166	Purina Mills, Ralston Purina Co. St. Louis, Mo.—Con. Purina Scratch Feed..... Purina Scratch Feed.....	Brown City..... Litchfield..... Average.....	11.9 12.7 12.1	10.3 10.8 10.4	3.4 2.8 3.0	3.4 3.5 3.2	\$4.25 4.25	Same as B 3446. Same as B 3446.
B 4712	Purina Scratch Feed..... Quaker Oats Co., Chicago, Ill.	Rochester..... (1919) { F.*	11.7	11.0	3.0	3.5	3.75	Same as B 3446, without milo and oats.
B 4968	Big Egg Scratch Grains no grit.....	Port Huron..... { G.* F.*	11.7 11.1	10.0 11.1	2.6 2.7	5.0 3.2	4.00	Wheat, corn, kafir, milo, barley, sunflower, screenings.
B 3852	Early Bird Chick Feed no grit.....	Lausling..... { F.* G.*	13.2 10.0	10.1 10.0	3.8 2.6	2.2 5.0	.....	Wheat, hulled oats, cracked corn, kafir, milo, wild buckwheat, millet, weed seeds, charcoal.
B 4900	Early Bird Chick Feed with grit.....	Lausling..... { F.* G.*	12.1 9.5	10.0 9.5	2.6 3.7	2.9 2.9	.....	Same as B 3852 with grit.
B 3784 B 3821 B 3821 B 3821 B 4326	Full-O-Pop Dry Mash..... Full-O-Pop Dry Mash..... Full-O-Pop Dry Mash..... Full-O-Pop Dry Mash..... Full-O-Pop Dry Mash.....	South Haven..... Holland..... Wayland..... Esauville..... Average.....	9.7 9.2 9.1 9.9 9.5	20.4 18.9 20.3 20.2 20.2	4.0 3.7 3.8 5.8 5.7	10.0 8.8 8.8 8.0 8.7	3.75 4.00 4.00 4.00 4.60	Cottonseed meal, gluten feed, hominy feed, meat scraps, bone meal, alfalfa meal, fish, ground grain screenings. Same as B 3874 with wheat bran and oat meal. Same as B 3784 with oat meal. Same as B 3784 with wheat bran and oat meal.
B 4080 B 4325	Full-O-Pop Scratch Grains..... Full-O-Pop Scratch Grains.....	Caro..... Esauville..... { G.* F.*	11.6 13.2	8.9 10.7	2.3 2.9	5.0 2.9	5.00 4.60	Wheat, corn, kafir, milo, buckwheat, barley, sunflower. Same as B 4080 without kafir.
B 4082 B 4211	Pussy Scratch Grains no grit..... Pussy Scratch Grains no grit.....	Caro..... Niles..... { G.* F.*	11.9 11.5	9.8 10.6	2.8 2.8	5.0 3.5	4.50 4.00	Wheat, oats, corn, kafir, milo, buckwheat, barley, sunflower. Same as B 4082.
B 4083	Pussy Scratch Grains with grit.....	Average.....	11.7	10.2	2.8	3.3	.....	Same as B 4082 with grit.
B 4504 B 4520	Quaker Scratch Grains no grit..... Quaker Scratch Grains no grit.....	Jackson..... Iron River..... { F.* G.*	10.9 12.1 12.6	9.4 10.6 10.0	2.2 2.7 2.6	3.2 3.0 2.7	3.40 4.50 3.50	Wheat, cracked corn, kafir, milo, buckwheat, barley, sunflower. Same as B 4504.
		Average.....	12.4	10.3	3.7	2.9	.....

B 4546	Schumacher Little Chick Feed no grit.....	{ G.* F.* }	10.0 10.8	8.5 5.5	5.0 3.1	.....	Wheat, oat meal, cracked corn, kafir, milo, wild buckwheat, millet, weed seeds, charcoal.
B 4300	Schumacher Little Chick Feed with grit.....	{ G.* F.* }	10.0 12.2	8.5 2.8	5.0 3.0	3.55	Same as B 4546 with grit.
B 3770	Schumacher Scratch Grains.....	{ G.* F.* }	10.0 11.3	8.5 3.1	5.0 2.2	3.10	Wheat, cracked corn, kafir, milo, buckwheat, barley, sunflower.
B 4443	Schumacher Scratch Grains.....	{ G.* F.* }	10.0 12.0	8.5 3.6	5.0 2.8	3.45	Same as B 3770 with oil cake.
B 4604	Schumacher Scratch Grains.....	{ G.* F.* }	10.0 12.0	8.5 2.6	5.0 2.6	4.00	Same as B 3770 with grit.
B 4999	Schumacher Scratch Grains.....	{ G.* F.* }	10.0 12.0	8.5 2.6	5.0 2.6	4.00	Same as B 3770 with screenings.
	Reach & Seiber Co., Marquette, Mich.						
B 4348	Rosco Scratch Feed.....	{ G.* F.* }	9.5 12.2	8.5 11.0	5.0 2.7	3.70	Wheat, oats, corn, kafir, buckwheat, barley, oil cake, sunflower.
B 4372	Rosco Scratch Feed.....	{ G.* F.* }	10.4 11.7	3.0 2.8	2.8 2.8	3.20	Wheat, oats, corn, kafir, buckwheat, barley, grit.
	Rosenbaum Brothers, Chicago, Ill.						
B 4776	Reebro Scratch Feed no grit.....	{ G.* F.* }	10.0 12.4	8.5 3.3	5.0 3.2	4.20	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.
B 4631	Vitality Chick Mash with Milk Albumen.....	{ G.* F.* }	16.0 11.5	4.0 14.1	8.0 3.8	3.85	Linseed meal, bone meal, alfalfa meal, corn feed, meal, ground oats and barley, wheat four middlings, milk albumen, calcium carbonate.
B 4632	Vitality Chick Mash with Milk Albumen.....	{ G.* F.* }	12.2 14.1	4.4 6.3	6.3 6.3	3.85	Same as B. 4631.
	Alfalfa meal, wheat middlings, red dog flour, oat flour, corn feed, meal, barley flour, milk albumen.						
B 4646	Vitality Fattening Mash with Milk Albumen.....	{ G.* F.* }	16.0 10.2	4.0 3.0	7.0 6.6	.....	Alfalfa meal, wheat middlings, red dog flour, oat flour, corn feed, meal, barley flour, milk albumen.
B 4773	Vitality Growing Scratch no grit.....	{ G.* F.* }	10.0 11.6	8.5 3.2	5.0 2.5	4.35	Wheat, oats, cracked corn, kafir, barley, millet.
B 4634	Vitality Scratch Feed with grit.....	{ G.* F.* }	10.0 12.9	8.5 3.0	5.0 3.8	3.90	Wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower, grit, shell.
B 4645	Will-Pay Chick Scratch no grit.....	{ G.* F.* }	10.0 11.5	8.5 3.3	5.0 2.1	.....	Cracked wheat, cracked corn, kafir, millet.
B 4775	Will-Pay Scratch Feed no grit.....	{ G.* F.* }	10.0 11.9	8.5 3.0	5.0 3.1	4.10	Wheat, oats, cracked corn, kafir, barley, sunflower.
B 4774	Will-Pay Scratch Feed with grit and shell.....	{ G.* F.* }	10.0 11.5	8.5 3.0	5.0 2.7	4.00	Same as B 4775 with grit and shell.
	Rosendall Bros., Grand Rapids, Mich.						
B 4296	Rosendall's Special Egg Mash.....	{ G.* F.* }	22.0 10.2	5.0 23.2	7.0 5.3	3.75	Linseed meal, meat scraps, alfalfa meal, wheat bran and middlings, corn meal.
B 4448	Ryde & Co., Chicago, Ill. Ryde's Milk Mash.....	{ G.* F.* }	20.0 8.9	5.0 20.1	7.0 11.5	5.00	Cottonseed meal, hominy feed, locust bean meal, ground lentils, cocoshell meal, blood flour, wheat flour, wheat middlings, dried milk, oat meal, corn meal, fourgreek, anise, salt.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Saginaw Milling Co., Saginaw, Mich.								
B 4473	Red Hen Chick Starter	Fenton.....	{ G.* 13.0	11.0	2.6	5.0	...	Peas, wheat, corn, kafir, millet. Same as B 4473.
B 4869	Red Hen Chick Starter	Southville.....	{ F.* 13.1	11.3 10.6	1.9 2.6	1.8 1.7	\$4.75 4.50	
		Average.....		13.1	11.0	2.3	1.8	
Red Hen Mash.								
B 4027	Red Hen Mash	Saginaw.....	{ G.* 9.8	16.5 19.3	5.5 4.3	10.0 7.2	3.30	Lined meal, meat scraps, alfalfa meal, wheat bran and middlings, corn meal.
B 3723	Red Hen Scratch Feed	Owosso.....	{ F.* 12.4	9.5 9.3	4.7 2.5	5.0 2.8	3.50	
B 4036	Red Hen Scratch Feed	Saginaw.....	{ G.* 12.9	10.8	3.0	2.9	3.50	Wheat, oats, corn, kafir, buckwheat, barley, sunflower. Same as B 3723.
B 4055	Red Hen Scratch Feed	Bay City.....	{ F.* 11.8	10.4	3.0	3.2	...	
B 4068	Red Hen Scratch Feed	Caro.....	{ G.* 12.6	10.1	2.9	3.4	...	Same as B 3723 with beans. Same as B 3723.
B 4159	Red Hen Scratch Feed	Millington.....	{ F.* 12.7	9.5	3.2	3.2	3.80	
B 4483	Red Hen Scratch Feed	Mt. Morris.....	{ G.* 14.3	10.3	3.2	2.9	3.75	Same as B 3723. Same as B 3723.
B 4570	Red Hen Scratch Feed	Southville.....	{ F.* 12.3	10.4	3.2	3.5	4.50	
B 4951	Red Hen Scratch Feed	Lapeer.....	{ G.* 12.0	10.1	3.1	3.3	3.50	Same as B 3723.
		Average.....		12.5	10.1	3.0	3.3	
Wolverine Scratch Feed								
B 4037	Wolverine Scratch Feed	Saginaw.....	{ G.* 11.9	9.4 10.7	5.0 3.6	5.0 4.2	3.35	Wheat, oats, corn, kafir, buckwheat, barley, wheat screenings. Same as B 4037.
B 4048	Wolverine Scratch Feed	Saginaw.....	{ F.* 11.5	10.2	3.4	3.7	4.00	
		Average.....		11.7	10.5	3.5	4.0	
Schuylen & Mok, Detroit, Mich.								
B 4726	Eagle Mash	Detroit.....	{ G.* 8.7	16.5 18.9	4.5 5.3	0.5 7.6	2.85	Meat scraps, alfalfa meal, wheat bran and middlings, corn meal, corn bran, screenings.
B 4725	Eagle Pigeon Feed	Detroit.....	{ F.* 11.0	2.6 2.5	3.4 4.0	4.45	...	
B 3395	Eagle Scratch Feed	Detroit.....	{ G.* 11.1	9.5 11.0	5.6 3.0	5.6 3.3	3.90	Peas, wheat, kafir, buckwheat. Oats, cracked corn, kafir, barley, sunflower. Same as B 3395, with wheat, without sunflower. Same as B 3395 with wheat and buckwheat.
B 2410	Eagle Scratch Feed	Detroit.....	{ F.* 11.4	10.1	3.0	2.8	4.00	
B 4970	Eagle Scratch Feed	Mt. Clemens.....	{ G.* 11.7	9.9	3.0	3.8	3.75	
		Average.....		11.7	10.3	3.0	3.3	
(1919)								
B 4973	Eagle Scratch Feed	Mt. Clemens.....	{ G.* 13.1	10.0 10.7	5.0 2.8	5.0 3.8	3.75	Wheat, corn, kafir, buckwheat, barley, sunflower, screenings. Meat scraps, alfalfa meal, wheat bran and middlings, corn meal. Cracked corn and millet.
B 3396	Meat Mash	Detroit.....	{ F.* 9.5	19.0 18.4	4.0 4.1	10.5 6.1	3.00	
B 3397	Pride Chick Feed	Detroit.....	{ G.* 9.9	9.8	3.8	3.8	4.00	

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton 0 cwt.	Principal ingredients identified.
Watson-Higgin Milling Co., Grand Rapids, Mich. —Con.								
B 3200	Perfection Scratch Feed	(1918) { G.* Grand Rapids... F.*	11.7	10.0	2.6	6.0	\$3.15	Wheat, oats, corn, kafir, buckwheat, barley, sunflower, grit.
B 4242	Perfection Scratch Feed	Cadillac... { F.*	12.5	10.3	3.1	3.9	3.85	Same as B 3200 without wheat and sunflower.
B 4292	Perfection Scratch Feed	Grandville... { F.*	12.4	13.0	2.9	3.5	.....	Same as B 3200 without sunflower.
	Average	.....	12.2	11.3	2.9	3.9	.....
E. L. Wellman Co., Grand Rapids, Mich.								
B 4406	Qualified Chick Feed with grit.	Clinton... { G.* F.*	11.0	10.0	2.6	6.0	3.25	Wheat, corn, kafir, wild buckwheat, millet, weed seeds, grit.
B 3768	Qualified Poultry Feed	South Haven... { F.*	12.0	10.4	2.8	3.5	3.50	Wheat, oats, cracked corn, kafir, milo, buckwheat, barley, sunflower.
B 3918	Qualified Poultry Feed	Casnovia... { F.*	11.7	10.0	3.1	3.1	4.00	Same as B 3768.
B 4061	Qualified Poultry Feed	Bay City... { F.*	10.7	10.0	2.6	3.0	3.85	Same as B 3768.
B 4589	Qualified Poultry Feed	East Jordan... { F.*	13.0	10.6	2.2	2.4	3.50	Same as B 3768.
B 4948	Qualified Poultry Feed	Lapeer... { F.*	11.4	10.7	2.4	3.5	4.00	Same as B 3768.
	Average	.....	11.8	10.3	2.6	3.1	.....
B 4084	Qualified Poultry Feed with grit.	Pigeon... { G.* F.*	10.0	10.0	2.6	6.0	4.00	Wheat, oats, kafir, milo, wild buckwheat, barley, wheat screenings, grit.
Wernath Flouring Mills, Bay City, Mich.								
B 4060	Wernath Chicken Feed	Bay City... { G.* F.*	11.8	9.4	2.9	5.3	3.35	Beans, wheat, oats, corn, buckwheat, barley.
C. C. Wright, Owosso, Mich.								
B 4746	Occident Chick Feed	Owosso... { G.* (1918) F.*	12.5	10.0	2.5	6.0	3.65	Wheat, oats, cracked corn, kafir, milo, barley.
B 3721	Wright's Mixture	Owosso... { F.*	8.0	5.0	7.0	2.1	.....	Wheat, oats, corn, barley, sunflower.
B 4747	Wright's Mixture	Owosso... { F.*	12.0	11.3	3.2	3.5	3.50	Salvage wheat, oats, cracked corn, kafir, buckwheat, barley, sunflower.
	Average	.....	12.1	10.5	2.6	3.6	3.60	
Young-Randolph Seed Co., Owosso, Mich.								
B 4782	Chick Feed	Owosso... { G.* F.*	10.7	10.0	2.0	2.6	3.90	Cracked corn, barley, millet.
B 4781	Scratch Feed	Owosso... { G.* F.*	10.9	10.1	4.2	4.8	3.86	Oats, cracked corn, buckwheat, barley, sunflower.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 3309	David Stott Flour Mills, Detroit, Mich. Stott's Winner Feed.....	{ G.* F.* } Detroit.....	10.0 10.7	10.0 8.5	5.0 3.6	10.0 9.1	\$15 50	Oat meal mill by-product, corn feed meal.
B 4312	Thunder Bay Milling Co., Alpena, Mich. Bradford's Chop.....	{ G.* F.* } Alpena.....	8.1 11.3	8.1 8.3	4.3 2.7	10.6 13.4	59 00	Oat hulls, corn flour, cracked corn.

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
WHEAT BRAN.							
Baldwin Flour Mills, Minneapolis, Minn.							
B 4374	Baldwin's Wheat Bran with not exceeding mill run ground screenings	Houghton { G.* F.*	10.0	14.5 12.9	4.0 5.5	12.0 11.9	\$54.00
Big Diamond Mills Co., Minneapolis, Minn.							
B 4108	Big Diamond Wheat Bran with ground screenings not exceeding mill run	Carsonville { G.* F.*	10.5	12.0 13.3	4.0 5.0	12.0 12.4	2.60
B 4133	Big Diamond Wheat Bran with ground screenings not exceeding mill run	Croswell	11.6	13.9	5.3	11.5	2.25
B 4310	Big Diamond Wheat Bran with ground screenings not exceeding mill run	Alpena	10.1	14.4	5.9	12.5	52.00
		Average	10.7	13.9	5.4	12.1	
J. P. Burroughs & Son, Flint, Mich.							
B 4470	Choice Winter Wheat Bran with ground screenings not exceeding mill run	Flint { G.* F.*	10.4	12.5 15.3	5.0 4.3	10.5 9.2	
B 4474	Choice Winter Wheat Bran with ground screenings not exceeding mill run	Fenton	10.8	14.3	3.3	8.3	2.70
		Average	10.6	14.8	3.8	8.8	
Cannon Valley Milling Co., Minneapolis, Minn.							
B 3975	C. V. Wheat Bran with ground screenings not exceeding mill run	Reed City { G.* F.*	9.8	13.0 15.1	4.0 6.1	14.6 10.6	58.00
B 4488	C. V. Wheat Bran with ground screenings not exceeding mill run	Chebaning	11.4	14.9	6.1	10.2	
		Average	10.6	15.0	6.1	10.4	
The Century Milling Co., Minneapolis, Minn.							
B 4241	Jersey Wheat Bran with ground screenings not exceeding mill run	Munising { G.* F.*	9.8	13.0 15.2	4.0 5.1	13.0 11.1	43.00
The Cereal Mills Co., Wausau, Wis.							
B 4540	Wheat Bran with ground screenings not exceeding mill run	Carney { G.* F.*	10.3	14.0 16.3	4.3 4.4	11.0 10.5	2.50
C. S. Christensen Co., Madella, Minn.							
B 4471	Wheat Bran with ground screenings	Flushing { G.* F.*	10.5	14.6 14.3	4.4 4.8	12.3 11.8	2.65
Claro Milling Co., Waseca, Minn.							
B 3475	Claro Wheat Bran with ground screenings not exceeding mill run	Grand Rapids { G.* F.*	11.0	14.0 14.8	5.0 5.1	12.0 12.1	38.00
Commander Mills Co., Minneapolis, Minn.							
B 4279	Commander Wheat Bran with ground screenings not exceeding mill run	Galesburg { G.* F.*	11.2	12.0 14.9	4.0 5.1	12.0 10.5	54.00
B 4064	Commander Wheat Bran with ground screenings not exceeding mill run	Imlay City	9.5	14.4	4.6	11.7	2.30
		Average	10.4	14.7	4.9	11.1	
Wm. A. Coombs Milling Co., Coldwater, Mich.							
B 3946	Wheat Bran with ground screenings not exceeding mill run	Kalamazoo { G.* F.*	10.2	14.0 14.8	5.0 4.3	9.0 9.3	50.00
B 4016	Wheat Bran with ground screenings not exceeding mill run	Coldwater	10.3	14.1	4.4	9.2	50.00
B 4151	Wheat Bran with ground screenings not exceeding mill run	Vassar	10.6	14.3	4.2	9.1	2.30
B 4181	Wheat Bran with ground screenings not exceeding mill run	Reading	9.6	15.4	3.7	8.5	2.45

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Wm. A. Coombs Milling Co., Coldwater, Mich.— Con.						
B 4182	Wheat Bran with ground screenings not exceeding mill run.	Quincy.....	10.7	15.6	4.0	9.5	\$2.75
B 4185	Wheat Bran with ground screenings not exceeding mill run.	Hudson.....	11.4	14.3	4.3	9.9	2.60
B 4451	Wheat Bran with ground screenings not exceeding mill run.	Quincy.....	10.5	15.4	4.6	9.1	2.75
B 4452	Wheat Bran with ground screenings not exceeding mill run.	Hudson.....	10.7	15.0	4.6	9.2	.....
B 4500	Wheat Bran with ground screenings not exceeding mill run.	Ypsilanti.....	10.8	14.8	5.0	9.6	2.70
B 4745	Wheat Bran with ground screenings not exceeding mill run.	Bronson.....	10.5	14.5	5.7	10.9	2.50
B 4908	Wheat Bran with ground screenings not exceeding mill run.	Denton.....	10.8	14.6	4.7	9.0	2.60
		Average.....	10.6	14.8	4.5	9.4	.....
	Crescent Milling Co., Minneapolis, Minn.						
B 3786	Crescent Wheat Bran with ground screenings not exceeding mill run.	South Haven.... { G.* F.*	11.1	14.8 13.7	3.8 5.0	12.0 9.9	50.00
	DeRoo & Company, Flint, Mich.						
B 4467	Wheat Bran with ground screenings not exceeding mill run.	Flint..... { G.* F.*	10.6	13.0 15.2	3.0 4.3	10.0 9.5	46.50
B 4485	Wheat Bran with ground screenings not exceeding mill run.	Clio.....	11.4	15.8	4.9	9.1	55.00
		Average.....	11.0	15.5	4.6	9.3	.....
	Duluth Universal Milling Co., Duluth, Minn.						
B 3503	Wheat Bran with ground screenings not exceeding mill run.	Detroit..... { G.* F.*	11.3	13.8 16.1	4.1 5.6	12.7 10.3	23.60
B 4337	Wheat Bran with ground screenings not exceeding mill run.	Newberry.....	10.6	16.3	5.5	10.6	2.25
B 4715	Wheat Bran with ground screenings not exceeding mill run.	Royal Oak.....	9.6	15.9	4.9	10.8	2.65
B 4968	Wheat Bran with ground screenings not exceeding mill run.	Mt. Clemens.....	10.1	16.4	5.5	10.7	2.50
		Average.....	10.4	16.2	5.4	10.6	.....
	Eagle Roller Mill Co., New Ulm, Minn.						
B 3714	Wheat Bran with ground screenings.	Owosso..... { G.* F.*	10.2	14.0 14.1	3.4 4.9	12.0 10.7	40.00
B 3747	Wheat Bran with ground screenings.	Perry.....	11.1	13.5	5.1	10.7	43.00
B 4109	Wheat Bran with ground screenings.	Carsonville.....	10.1	14.6	5.1	11.7	2.60
B 4355	Wheat Bran with ground screenings.	Negaunee.....	10.2	13.9	5.3	10.9	2.75
B 4537	Wheat Bran with ground screenings.	Manistique.....	11.5	15.4	5.6	10.3	51.00
		Average.....	10.6	14.3	5.2	10.9	.....
	B. A. Eckhart Milling Co., Chicago, Ill.						
B 3595	Wheat Bran and Screenings	Albion..... { G.* F.*	10.0	14.0 15.8	4.0 4.5	11.0 10.2	45.00
B 3600	Wheat Bran and Screenings	Albion.....	10.4	17.3	4.5	9.6	2.35
B 4707	Wheat Bran and Screenings	Oxford.....	9.9	15.4	4.5	9.4	2.50
		Average.....	10.1	16.2	4.5	9.7	.....
	Empire Milling Co., Minneapolis, Minn.						
B 4062	Empire Bran with ground screenings	Bay City..... { G.* F.*	10.2	12.0 14.8	4.0 4.7	12.0 11.0	2.70
B 4106	Empire Bran with ground screenings	Yale.....	11.4	13.9	5.1	10.9	40.50
B 4129	Empire Bran with ground screenings	Croswell.....	11.2	14.4	5.5	11.5	50.00
B 4158	Empire Bran with ground screenings	Vassar.....	11.9	14.2	4.6	10.5	2.50
B 4501	Empire Bran with ground screenings	Stambaugh.....	10.2	14.6	5.0	10.5	2.75
		Average.....	11.0	14.4	5.0	11.0

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Everett Aughenbaugh Co., Waseca, Minn.						
B 4156	Eaco Wheat Bran with ground screenings.....	Vassar..... { G.* F.*	12.5 14.6	14.0 5.4	3.0 9.6	18.0 9.6	\$2.50
B 4407	Eaco Wheat Bran with ground screenings.....	Jackson.....	11.6	15.0	5.5	10.4	2.50
		Average.....	12.1	14.8	5.5	10.0	.....
	Gooch Milling & Elevator Co., Lincoln, Neb.						
B 4225	Wheat Bran and ground screenings.....	Benton Harbor.. { G.* F.*	9.9 18.1	15.5 4.1	2.5 10.0	10.0 10.0	55.00
	Hankey Milling Co., Petoskey, Mich.						
B 4819	Bran with mill run screenings.....	Mancelona..... { G.* F.*	11.1 15.0	13.5 5.1	3.7 9.1	9.5 9.1	2.65
	Hannah & Lay Co., Traverse City, Mich.						
B 4833	Wheat Bran with ground screenings not exceeding mill run.....	Traverse City... { G.* F.*	10.4 15.1	15.0 5.0	5.0 11.6	11.7 11.7	48.00
	Harris Milling Co., Mt. Pleasant, Mich.						
B 4852	Bran with ground screenings.....	Frankfort..... { G.* F.*	10.9 11.0	13.9 13.5	3.0 4.1	13.0 11.1	2.50
B 4863	Bran with ground screenings.....	Manistee.....	11.0	13.5	4.1	11.3	2.75
		Average.....	11.0	13.7	4.0	11.2	.....
	W. J. Jennison Co., Minneapolis, Minn.						
B 3400	Wheat Bran with ground screenings not exceeding mill run.....	(1918) Detroit..... { G.* F.*	10.7 14.5	14.0 4.8	4.0 10.3	14.0 10.3	33.60
B 3956	Wheat Bran with ground screenings not exceeding mill run.....	Edmore.....	9.7	14.1	5.6	10.9	55.00
B 4105	Wheat Bran with ground screenings not exceeding mill run.....	North Branch.....	11.8	13.8	5.3	11.2	2.50
		Average.....	10.7	14.1	5.2	10.8	.....
		(1919)					
B 4065	Wheat Bran with ground screenings not exceeding mill run.....	Bay City..... { G.* F.*	9.4 14.2	12.0 5.3	4.0 10.4	12.0 10.4	2.40
B 4161	Wheat Bran with ground screenings not exceeding mill run.....	Millington.....	10.9	14.3	4.6	11.7	2.15
B 4301	Wheat Bran with ground screenings not exceeding mill run.....	Gladwin.....	10.4	14.1	5.8	11.9	53.00
B 4305	Wheat Bran with ground screenings not exceeding mill run.....	Pinconning.....	10.1	15.0	5.3	11.2	54.00
B 4885	Wheat Bran with ground screenings not exceeding mill run.....	Clifford.....	11.4	13.9	5.2	11.0	2.75
		Average.....	10.4	14.3	5.2	11.2	.....
	The Kansas Flour Mills Co., Kansas City, Mo.						
B 4053	Wheat Bran and Wheat Screenings.....	Bay City..... { G.* F.*	9.7 14.5	16.5 3.5	4.6 11.0	9.6 11.0	.....
	The Kaw Milling Co., Topeka, Kansas.						
B 3185	Kaw Kaw Wheat Bran and screenings not to exceed 8%.....	Coopersville... { G.* F.*	9.3 16.2	14.5 4.1	3.5 7.6	11.0 7.6	40.00
B 3485	Kaw Kaw Wheat Bran and screenings not to exceed 8%.....	Forest Grove.....	10.9	16.8	3.8	8.7	42.00
		Average.....	10.2	16.5	4.0	8.2	.....
		(1919)					
B 3427	Kaw Kaw Wheat Bran and sourings.....	Nunica..... { G.* F.*	10.9 9.4	14.5 18.7	3.5 4.1	6.5 8.6	39.50
B 4288	Kaw Kaw Wheat Bran and sourings.....	Coopersville.....	9.4	18.3	4.2	9.1	50.00
		Average.....	10.2	18.5	4.2	8.9	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	The Larabee Flour Mills Corp., Kansas City, Mo.						
B 3971	Wheat Bran with mill run screenings not to exceed 8%.	Clare..... { G.* F.*	15.0 9.2	3.5 16.3	10.5 4.3	10.5 10.3	\$53.00
B 4952	Wheat Bran with mill run screenings not to exceed 8%.	Capac.....	9.6	16.9	3.9	10.4	2.30
B 4956	Wheat Bran with mill run screenings not to exceed 8%.	Port Huron.....	9.5	17.8	4.3	10.3	2.75
		Average.....	9.4	17.0	4.2	10.5	
	Lindsborg Milling & Elevator Co., Lindsborg, Kansas.						
B 3826	Wheat Bran and screenings.....	Holland..... { G.* F.*	14.5 9.8	3.5 16.9	11.0 4.4	10.6 10.6	34.00
B 3850	Wheat Bran and screenings.....	Sparta.....	11.0	17.3	4.7	7.7	42.00
B 4930	Wheat Bran and screenings.....	Mt. Clemens.....	9.0	16.5	4.4	10.8	2.50
		Average.....	9.9	16.9	4.5	9.7	
	Montana Flour Mills Co., Lewiston, Montana.						
B 3493	Monteo Wheat Bran with ground screenings not exceeding mill run.....	Vriesland..... { G.* F.*	13.8 12.0	3.7 16.9	13.9 4.1	9.8 9.8	42.00
B 3769	Monteo Wheat Bran with ground screenings not exceeding mill run.....	South Haven.....	11.5	16.9	4.9	10.0	40.00
B 3893	Monteo Wheat Bran with ground screenings not exceeding mill run.....	Muskegon.....	11.3	16.3	4.8	10.0	38.00
B 4249	Monteo Wheat Bran with ground screenings not exceeding mill run.....	Big Rapids.....	11.4	16.3	4.8	10.2	55.00
		Average.....	11.6	16.6	4.7	10.0	
	New Prague Flouring Mills Co., New Prague, Minn.						
B 4070	Seal of Minnesota Wheat Bran with ground screenings not exceeding mill run.....	Caro..... { G.* F.*	13.3 10.3	3.0 14.5	13.0 5.0	10.4 10.4	2.80
B 4076	Seal of Minnesota Wheat Bran with ground screenings not exceeding mill run.....	Caro.....	10.3	14.6	5.2	9.8	2.35
B 4090	Seal of Minnesota Wheat Bran with ground screenings not exceeding mill run.....	Bad Axe.....	9.3	14.2	5.4	10.7	55.00
B 4141	Seal of Minnesota Wheat Bran with ground screenings not exceeding mill run.....	Marlette.....	11.0	14.5	5.3	10.5	2.50
B 4529	Seal of Minnesota Wheat Bran with ground screenings not exceeding mill run.....	Bark River.....	10.2	14.2	5.3	10.7	2.50
		Average.....	10.2	14.4	5.2	10.4	
	New Richmond Roller Mills Co., New Richmond, Wis.						
B 4335	Wheat Bran with ground screenings not to exceed mill run.....	Sault Ste. Marie. { G.* F.*	13.0 10.5	3.2 14.4	13.0 4.5	10.1 10.1	42.00
B 4340	Wheat Bran with ground screenings not to exceed mill run.....	Munising.....	9.5	14.6	5.7	9.4	43.00
		Average.....	10.0	14.5	5.1	9.8	
	Northern Milling Co., Wausau, Wis.						
B 4563	Wheat Bran with ground screenings.....	Rock..... { G.* F.*	14.0 9.6	4.0 13.2	15.0 5.1	12.0 12.0	2.75
	Oriental Mills, Manitowoc, Wis.						
B 4871	Wheat Bran with ground screenings.....	Scottville..... { G.* F.*	15.0 10.7	4.0 13.0	11.0 4.2	9.0 9.0	2.75
	Pillsbury Flour Mills, Minneapolis, Minn.						
B 3576	Wheat Bran with ground screenings not exceeding mill run.....	Detroit..... { G.* F.*	13.0 10.3	4.0 15.1	15.0 4.8	11.0 11.0	
B 4150	Wheat Bran with ground screenings not exceeding mill run.....	Vassar.....	11.1	14.2	5.1	11.9	2.30
B 4371	Wheat Bran with ground screenings not exceeding mill run.....	Houghton.....	10.2	15.1	5.5	10.9	55.00
B 4476	Wheat Bran with ground screenings not exceeding mill run.....	Holly.....	9.7	16.6	3.7	12.2	2.95
		Average.....	10.4	15.3	4.8	11.5	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
B 4127	Red Star Milling Co., Wichita, Kans.	Palms.....	{ G.*	14.5	3.5	10.0	\$2.25
			{ F.*	10.7	16.8	4.8	
B 4874	Red Wing Milling Co., Red Wing, Minn.	Ludington.....	{ G.*	13.5	4.1	15.6	2.60
			{ F.*	10.2	14.8	5.7	
B 3606	Sheffield King Milling Co., Minneapolis, Minn.	Marshall.....	{ G.*	13.5	3.5	18.7	45.50
			{ F.*	10.0	18.1	4.3	
B 4101	Stanard Tilton Milling Co., St. Louis, Mo.	Case City.....	{ G.*	14.5	4.0	9.5	40.00
			{ F.*	11.3	18.1	4.6	
B 3420	Star & Crescent Milling Co., Chicago, Ill.	Grand Rapids....	{ G.*	15.0	4.0	10.0	2.20
			{ F.*	10.6	16.5	4.3	
B 3450	Star and Crescent Bran.....	Zeeland.....		11.2	13.8	5.0	38.00
B 3815	Star and Crescent Bran.....	Holland.....		10.2	14.0	5.1	37.10
B 3892	Star and Crescent Bran.....	Muskegon.....		10.7	15.8	3.6	39.00
B 4865	Star and Crescent Bran.....	Scottville.....		10.6	14.6	4.4	8.00
		Average.....		11.9	14.9	4.5	
B 3511	David Stott Flour Mills, Detroit, Mich.	Detroit.....	{ G.*	14.0	4.0	18.0	27.46
			{ F.*	11.0	15.7	4.6	
B 4446	Valier & Spies Milling Co., St. Louis, Mo.	Trenton.....	{ G.*	14.5	3.5	10.0	2.50
			{ F.*	9.9	17.9	4.4	
B 4496	Valier's Wheat Bran with ground screenings.....	Ypsilanti.....		10.7	18.4	4.8	
		Average.....		10.3	18.2	4.6	
B 3793	Valley City Milling Co., Grand Rapids, Mich.	Hartford.....	{ G.*	14.0	3.5	10.0	42.00
			{ F.*	10.4	14.1	4.1	
B 3862	Rowena Wheat Bran with ground screenings not exceeding mill run.....	Grand Rapids.....		10.8	14.1	4.2	37.10
B 3613	Rowena Wheat Bran with ground screenings not exceeding mill run.....	Marshall.....		10.7	14.6	3.8	41.00
B 3708	Rowena Wheat Bran with ground screenings not exceeding mill run.....	St. Johns.....		10.3	15.3	4.1	40.00
B 3773	Rowena Wheat Bran with ground screenings not exceeding mill run.....	South Haven.....		11.1	14.1	4.0	40.00
B 4207	Rowena Wheat Bran with ground screenings not exceeding mill run.....	Vicksburg.....		10.3	15.6	4.4	60.00
B 4812	Rowena Wheat Bran with ground screenings not exceeding mill run.....	Boyne City.....		10.2	15.1	4.0	45.00
		Average.....		10.5	14.7	4.1	
B 3175	Voigt Milling Co., Grand Rapids, Mich.	Hudsonville.....	{ G.*	14.0	4.0	11.0	38.00
			{ F.*	10.0	15.6	3.6	
B 3842	Crescent Brand Bran with mill run screenings.....	Wayland.....		10.8	14.4	3.7	2.25
B 3908	Crescent Brand Bran with mill run screenings.....	Hudsonville.....		10.4	15.8	3.7	38.00
B 3611	Crescent Brand Bran with mill run screenings.....	Grand Rapids.....		9.2	16.0	4.3	46.00
		Average.....		10.1	15.5	4.8	
B 4422	Wagner White Co., Inc., Jackson, Mich.	Morenci.....	{ G.*	14.5	3.5	10.0	2.70
			{ F.*	10.0	17.0	4.0	
B 4423	Wheat Bran with screenings.....	Morenci.....		10.1	20.3	3.9	53.00
		Average.....		10.1	18.7	4.0	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Washburn-Crosby Co., Minneapolis, Minn.							
B 3383	Wheat Bran with ground screenings not exceeding mill run.	Detroit..... { G.* F.*	11.3	13.0 14.8	4.0 5.1	13.0 11.4	\$52.00
B 3479	Wheat Bran with ground screenings not exceeding mill run.	Comstock Park.....	10.6	15.6	4.1	16.5	35.80
B 3515	Wheat Bran with ground screenings not exceeding mill run.	Detroit.....	9.5	14.1	5.6	10.8	44.00
B 3668	Wheat Bran with ground screenings not exceeding mill run.	Lansing.....	9.6	14.8	4.8	11.6	.....
B 4367	Wheat Bran with ground screenings not exceeding mill run.	Chasell.....	10.8	13.9	5.8	11.0	2.50
B 4883	Wheat Bran with ground screenings not exceeding mill run.	Ludington.....	11.0	15.0	5.2	10.4	2.70
		Average.....	10.5	14.7	5.1	11.9	.....
Western Flour Mill Co., Davenport, Iowa.							
B 4136	Black Hawk Wheat Bran with ground screenings not exceeding mill run.	Palms..... { G.* F.*	10.9	13.3 16.0	3.0 4.9	15.5 10.5	2.25
B 4803	Black Hawk Wheat Bran with ground screenings not exceeding mill run.	Petoskey.....	10.1	15.6	4.8	11.3	2.80
		Average.....	10.5	15.8	4.9	10.9	.....
Willy & Company, Appleton, Wis.							
B 4505	Wheat Bran with ground screenings not exceeding mill run.	Crystal Falls..... { G.* F.*	11.0	15.0 13.5	4.0 5.3	11.0 10.1	2.75
WHEAT MIDDINGS.							
Baldwin Flour Mills Co., Minneapolis, Minn.							
B 4400	Baldwin Wheat Flour Middlings with not exceeding mill run of ground screenings.	Ironwood..... { G.* F.*	11.2	16.5 13.7	5.0 4.7	7.0 5.8	52.00
Bay State Milling Co., Winona, Minn.							
B 4046	Bay State Wheat Middlings and wheat screenings.	Saginaw..... { G.* F.*	9.5	16.5 17.2	5.0 6.1	8.3 7.1	2.35
B 4327	Bay State Wheat Middlings and wheat screenings.	Sault Ste. Marie.....	11.2	17.4	5.7	6.9	45.00
B 4527	Bay State Wheat Middlings and wheat screenings.	Bark River.....	11.0	17.2	5.9	6.7	2.65
B 4536	Bay State Wheat Middlings and wheat screenings.	Manistique.....	10.9	16.9	5.7	7.0	2.75
		Average.....	10.7	17.2	5.9	6.9	.....
Big Diamond Mills Co., Minneapolis, Minn.							
B 3965	Big Diamond Standard Middlings with ground screenings.	Ithaca..... { G.* F.*	9.9	15.0 16.1	5.0 5.6	10.0 8.2	41.00
B 4311	Big Diamond Standard Middlings with ground screenings.	Alpena.....	10.5	16.5	5.9	8.1	56.00
		Average.....	10.2	16.3	5.8	8.2	.....
The Century Milling Co., Minneapolis, Minn.							
B 4342	Poland Standard Middlings with ground screenings not exceeding mill run.	Munising..... { G.* F.*	9.6	14.0 18.1	4.0 6.0	11.0 7.8	45.00
B 4555	Poland Standard Middlings with ground screenings not exceeding mill run.	Menominee.....	10.9	18.2	5.8	7.7	2.80
		Average.....	10.3	18.2	5.9	7.8	.....
Commander Mill Co., Minneapolis, Minn.							
B 4276	Commander Wheat Standard Middlings.	Galesburg..... { G.* F.*	11.8	15.0 16.3	5.0 5.7	10.0 8.1	56.00
B 4404	Commander Wheat Standard Middlings.	Teoumseh.....	11.0	16.1	6.0	7.9	2.95
B 4953	Commander Wheat Standard Middlings.	Imlay City.....	10.0	17.0	5.6	6.0	2.40
		Average.....	10.9	16.5	5.8	7.3	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Commercial Milling Co., Detroit, Mich.						
B 3335	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit..... { G.*	11.3	13.5	4.5	10.0	.....
B 3354	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit..... { F.*	10.9	16.4	4.5	7.6	\$40.00
B 3374	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.6	17.0	4.3	6.5	40.00
B 3389	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	9.9	17.4	4.6	7.0	37.80
B 3507	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.2	16.6	4.5	6.6	37.00
B 3527	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.3	17.9	4.8	7.5	37.00
B 3540	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.3	18.2	5.1	7.0	51.00
B 3550	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.7	18.1	4.3	7.0	43.09
B 3585	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.9	18.4	4.5	7.4	48.00
B 3599	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	8.8	16.9	4.6	6.7	44.00
B 3624	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	12.2	17.8	4.6	7.3	37.75
B 3651	Standard Wheat Middlings with ground screenings not exceeding mill run	Detroit.....	11.9	17.6	4.3	7.2	43.00
B 4587	Standard Wheat Middlings with ground screenings not exceeding mill run	Bellaire.....	11.9	16.6	4.5	7.1	2.70
B 4816	Standard Wheat Middlings with ground screenings not exceeding mill run	Boyne City.....	11.9	17.3	4.9	7.6	2.90
	Consolidated Flour Mills Co., Hutchinson, Kansas.	Average.....	11.3	17.4	4.6	7.1	.....
B 4478	Wheat Shorts and Screenings.....	Holly..... { G.*	11.5	16.0	3.5	8.0	.....
	Wm. A. Coombs Milling Co., Coldwater, Mich.	Holly..... { F.*	11.5	20.9	4.7	5.9	2.50
B 4017	Rob Roy Feed Wheat Middlings with ground screenings not exceeding mill run	Coldwater..... { G.*	11.0	15.0	3.0	6.0	.....
B 4180	Rob Roy Feed Wheat Middlings with ground screenings not exceeding mill run	Coldwater..... { F.*	11.0	16.7	4.6	6.4	52.00
B 4184	Rob Roy Feed Wheat Middlings with ground screenings not exceeding mill run	Reading.....	11.4	16.4	4.6	7.6	2.75
B 4450	Rob Roy Feed Wheat Middlings with ground screenings not exceeding mill run	Hudson.....	11.3	17.6	4.5	6.8	3.00
B 4453	Rob Roy Feed Wheat Middlings with ground screenings not exceeding mill run	Quincy.....	10.8	16.8	4.8	7.6	3.00
		Hudson.....	11.3	18.0	4.5	6.5	.....
	Crescent Milling Co., Minneapolis, Minn.	Average.....	11.2	17.1	4.6	7.0	.....
B 3787	Crescent Wheat Middlings with ground screenings not exceeding mill run	South Haven... { G.*	11.2	15.8	3.8	10.0	.....
	Duluth Superior Milling Co., Duluth, Minn.	South Haven... { F.*	11.2	15.6	5.1	7.5	52.00
B 4389	Diamond S Standard Middlings with ground screenings	Ontonagon..... { G.*	10.5	16.0	5.2	10.5	.....
	Duluth Universal Milling Co., Duluth, Minn.	Ontonagon..... { F.*	10.5	17.3	6.3	7.6	3.25
B 4336	Wheat Flour Middlings with ground screenings	Newberry..... { G.*	11.0	16.8	5.0	5.6	.....
	Eagle Roller Mill Co., New Ulm, Minn.	Newberry..... { F.*	11.0	17.9	6.1	6.5	2.50
B 3713	Standard Middlings with ground screenings not exceeding mill run	Owosso..... { G.*	10.9	14.0	4.0	11.0	.....
B 4354	Standard Middlings with ground screenings not exceeding mill run	Owosso..... { F.*	10.9	15.8	5.0	8.7	37.00
B 4538	Standard Middlings with ground screenings not exceeding mill run	Negaunee.....	11.5	16.1	4.9	8.8	3.00
		Manistique.....	11.8	16.4	5.3	7.7	50.00
		Average.....	11.4	16.1	5.1	8.4	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Empire Milling Co., Minneapolis, Minn.							
B 4107	Empire Wheat Standard Middlings with ground screenings not exceeding mill run.....	Yale..... { G.* F.*	15.0 11.2	5.0 15.8	10.0 5.1	8.0	\$42.00
B 4130	Empire Wheat Standard Middlings with ground screenings not exceeding mill run.....	Crowell.....	11.4	15.6	5.1	10.0	2.80
B 4366	Empire Wheat Standard Middlings with ground screenings not exceeding mill run.....	Chassell.....	10.8	16.1	5.8	8.4	3.00
		Average.....	11.1	15.8	5.3	8.8	.....
Gooch Milling Co., Lincoln, Neb.							
B 4226	Wheat Shorts with ground screenings.....	Benton Harbor... { G.* F.*	18.0 10.4	4.7 20.3	5.8 5.2	6.5	60.00
Hannah & Lay Co., Traverse City, Mich.							
B 4839	Wheat Middlings with ground screenings not exceeding mill run.....	Traverse City... { G.* F.*	17.0 11.1	4.6 16.8	7.4 5.4	7.3	50.00
Hubbard Milling Co., Mankato, Minn.							
B 4539	Standard Fine Middlings with ground screenings not exceeding mill run.....	Nadeau..... { G.* F.*	15.0 11.0	5.0 17.1	11.0 5.4	8.1	2.70
Ismert Hinoke Milling Co., Kansas City, Mo.							
B 3429	ABC Wheat Middlings with mill run ground screenings.....	Grand Haven... { G.* F.*	16.0 11.3	3.5 19.6	6.5 4.5	6.9	38.00
B 3904	ABC Wheat Middlings with mill run ground screenings.....	Muskegon Heights.....	11.2	18.8	4.1	6.7	40.00
B 4429	ABC Wheat Middlings with mill run ground screenings.....	Blissfield.....	10.6	19.8	4.5	6.4	.....
		Average.....	11.0	19.4	4.4	6.7	.....
W. J. Jennison Co., Minneapolis, Minn.							
B 4104	Wheat Flour Middlings with ground screenings not exceeding mill run.....	North Branch... { G.* F.*	16.0 11.8	5.0 16.4	8.0 5.6	7.6	2.75
B 4160	Wheat Flour Middlings with ground screenings not exceeding mill run.....	Millington.....	11.3	16.9	5.2	6.8	2.65
B 4302	Wheat Flour Middlings with ground screenings not exceeding mill run.....	Gladwin.....	10.9	16.7	6.0	7.7	58.00
B 4884	Wheat Flour Middlings with ground screenings not exceeding mill run.....	Clifford.....	11.7	16.7	5.5	6.9	55.00
		Average.....	11.4	16.7	5.6	7.3	.....
B 3501	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Detroit..... { G.* F.*	15.0 12.1	5.0 16.8	10.0 5.2	6.4	37.50
B 3955	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Edmore.....	10.5	15.9	5.9	7.4	55.00
B 4066	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Bay City.....	10.6	16.3	5.9	7.0	2.50
		Average.....	11.1	16.3	5.7	6.9	.....
The Kaw Milling Co., Topeka, Kansas.							
B 3426	Kaw Kaw Standard Shorts with ground screenings.....	Nunica..... { G.* F.*	16.0 12.1	3.5 19.6	6.5 4.0	4.9	41.50
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 4153	Badger Fancy Middlings with ground screenings and corn red dog flour.....	Vassar..... { G.* F.*	12.0 10.4	4.0 12.6	7.0 5.9	3.3	3.00
Larabee Flour Mills Corporation, Hutchinson, Kansas.							
B 4955	Standard Wheat Shorts with ground screenings....	Port Huron..... { G.* F.*	17.0 10.1	4.2 21.2	6.8 5.8	5.7	2.75

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Marinette Flour Mill Co., Marinette, Wis.						
B 4507	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Iron Mountain..... { G.* F.*	11.1	16.0 16.0	5.0 4.9	8.0 9.6	\$2.75
	The Mennel Milling Co., Toledo, Ohio.						
B 3922	Mennel Middlings with ground screenings not exceeding mill run.....	Middleton..... { G.* F.*	10.0	15.0 16.3	4.0 5.1	6.5 7.7	
	Michigan Milling Co., Ann Arbor, Mich.						
B 4462	Mimico Fancy Wheat Middlings with ground screenings.....	Durand..... { G.* F.*	10.7	14.1 17.0	4.6 5.1	5.7 6.9	50.00
	Montana Flour Mills Co., Lewiston, Montana.						
B 3494	Monteo Wheat Middlings with ground screenings not exceeding mill run.....	Vriesland..... { G.* F.*	11.7	15.7 16.6	4.7 5.3	9.6 9.2	
B 3740	Monteo Wheat Middlings with ground screenings not exceeding mill run.....	Mason.....	10.3	16.6	4.7	7.7	48.00
B 3770	Monteo Wheat Middlings with ground screenings not exceeding mill run.....	South Haven.....	10.7	16.7	4.9	8.9	46.00
		Average.....	10.9	16.6	5.0	8.6	
	New Richmond Roller Mills Co., New Richmond, Wis.						
B 4339	Wheat Middlings with ground screenings not exceeding mill run.....	Munising..... { G.* F.*	9.5	13.0 15.7	3.5 5.1	9.0 9.2	45.00
B 4351	Wheat Middlings with ground screenings not exceeding mill run.....	Marquette.....	10.3	14.9	5.1	8.8	2.70
B 4519	Wheat Middlings with ground screenings not exceeding mill run.....	Escanaba.....	11.4	15.1	5.4	8.9	47.00
		Average.....	10.4	15.2	5.2	9.0	
	Northern Milling Co., Wausau, Wis.						
B 4562	Wheat Middlings with ground screenings.....	Rock..... { G.* F.*	9.6	15.0 17.1	4.0 6.0	8.0 7.5	2.75
	The Northwestern Consolidated Milling Co., Minneapolis, Minn.						
B 3421	Wheat Flour Middlings with ground screenings not exceeding mill run.....	Grand Rapids... { G.* F.*	10.6	15.5 18.2	4.5 5.2	6.0 7.1	2.35
B 4330	Wheat Flour Middlings with ground screenings not exceeding mill run.....	Sault Ste. Marie.....	9.9	16.3	6.4	8.0	58.00
		Average.....	10.3	17.3	5.8	7.6	
B 4524	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Escanaba..... { G.* F.*	10.5	15.0 15.4	4.5 6.2	11.0 9.4	2.25
	Northwestern Elevator & Mill Co., Toledo, Ohio.						
B 4424	Wheat Middlings with ground screenings.....	Morenci..... { G.* F.*	10.0	14.0 16.3	3.0 4.6	9.0 7.1	57.00
	Omaha Flour Mills Co., Omaha, Nebraska.						
B 4074	Omar Wheat Shorts and ground wheat screenings not exceeding 8%.....	Caro..... { G.* F.*	10.6	15.0 19.3	3.5 5.0	8.0 6.4	2.60
B 4571	Omar Wheat Shorts and ground wheat screenings not exceeding 8%.....	Charlevoix.....	9.8	19.3	4.9	8.0	49.00
		Average.....	10.2	19.3	5.0	7.2	
	Pillsbury Flour Mills Co., Minneapolis, Minn.						
B 4370	Wheat A Middlings with ground screenings not exceeding mill run.....	Houghton..... { G.* F.*	10.3	15.0 18.2	4.0 5.7	8.0 6.0	61.50
B 3574	Wheat Standard B Middlings with ground screenings not exceeding mill run.....	Detroit..... { G.* F.*	10.8	14.0 16.3	4.0 4.4	11.0 9.4	43.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Pillsbury Flour Mills Co., Minneapolis, Minn. —Con.						
B 4369	Wheat Standard B Middlings with ground screenings not exceeding mill run.	Houghton.....	10.3	15.6	5.7	10.0	\$55.50
B 4533	Wheat Standard B Middlings with ground screenings not exceeding mill run.	Wilson.....	10.5	14.6	4.9	9.5	3.00
B 4882	Wheat Standard B Middlings with ground screenings not exceeding mill run.	Ludington.....	11.0	15.8	5.3	9.5	2.90
		Average.....	10.7	15.6	5.1	9.6	.....
	Shane Bros. & Wilson, Co. Minneapolis, Minn.						
B 4396	Snowball Wheat Flour Middlings with ground screenings.	Ironwood.....	{ G.* 16.5 F.* 11.0	5.5 5.6	6.0 7.1	.....	2.70
B 3719	Wheat Standard Middlings with ground screenings.	Owosso.....	{ G.* 15.3 F.* 11.5	6.4 6.2	10.6 7.7	.....	39.00
B 4360	Wheat Standard Middlings with ground screenings.	Negaunee.....	10.4	17.2	5.5	8.2	2.75
B 4576	Wheat Standard Middlings with ground screenings.	Charlevoix.....	10.3	16.8	5.7	9.1	2.60
		Average.....	10.7	17.0	5.5	8.3	.....
	The Southwestern Milling Co., Inc., Kansas City, Mo.						
B 4541	Red Turkey Wheat Brown Shorts and Wheat Scourings.	Carney.....	{ G.* 15.0 F.* 11.7	4.8 4.6	8.5 8.0	.....	2.70
	Stanard Tilton Milling Co., St. Louis, Mo.						
B 4100	Wheat Middlings with screenings not exceeding mill run.	Cass City.....	{ G.* 15.0 F.* 11.2	4.0 5.2	6.0 6.0	.....	42.00
	Star & Crescent Milling Co., Chicago, Ill.						
B 4862	Star Wheat Middlings with ground screenings not exceeding mill run.	Manistee.....	{ G.* 15.0 F.* 11.0	4.0 4.9	8.0 8.9	.....	2.85
B 4866	Star Wheat Middlings with ground screenings not exceeding mill run.	Scottville.....	11.3	17.2	5.0	7.6	3.00
		Average.....	11.2	16.8	5.0	8.3	.....
	David Stott Flour Mills, Detroit, Mich.						
B 3373	Pennant Wheat Middlings and Wheat Screenings.	Detroit.....	{ G.* 15.5 F.* 11.5	5.0 4.0	7.0 5.7	.....	34.66
B 3510	Pennant Wheat Middlings and Wheat Screenings.	Detroit.....	11.0	16.9	4.3	7.1	29.46
B 3564	Pennant Wheat Middlings and Wheat Screenings.	Detroit.....	11.9	17.4	4.6	6.2	48.00
B 3570	Pennant Wheat Middlings and Wheat Screenings.	Detroit.....	11.1	17.2	4.4	6.3	44.00
B 3652	Pennant Wheat Middlings and Wheat Screenings.	Detroit.....	11.8	16.1	4.2	6.6	2.35
B 4434	Pennant Wheat Middlings and Wheat Screenings.	Adrian.....	10.1	17.6	4.5	7.1	59.00
B 4717	Pennant Wheat Middlings and Wheat Screenings.	Royal Oak.....	9.9	17.6	4.9	6.7	2.70
		Average.....	11.0	17.0	4.4	6.5	.....
	St. Paul Milling Co., St. Paul, Minn.						
B 4509	Komo Standard Middlings with ground screenings not exceeding mill run.	Vulcan.....	{ G.* 15.0 F.* 11.4	4.5 7.1	10.5 10.5	.....	2.75
B 4543	Komo Standard Middlings with ground screenings not exceeding mill run.	Daggett.....	10.3	16.4	6.6	8.6	2.70
		Average.....	10.9	16.6	6.9	9.6	.....
	Valley City Milling Co., Grand Rapids, Mich.						
B 3412	Rowena Wheat Middlings with ground screenings not exceeding mill run.	Grand Rapids..	{ G.* 15.5 F.* 11.2	4.3 4.1	9.0 6.9	.....	2.35
B 3415	Rowena Wheat Middlings with ground screenings not exceeding mill run.	Grand Rapids..	10.4	15.6	4.4	7.1	41.00
B 3587	Rowena Wheat Middlings with ground screenings not exceeding mill run.	Albion.....	10.4	15.2	4.6	7.5	40.00
B 3614	Rowena Wheat Middlings with ground screenings not exceeding mill run.	Marshall.....	10.7	15.5	4.6	8.2	43.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fiber.	Crude fat.	Price per ton or cwt.
Valley City Milling Co., Grand Rapids, Mich.—Con.							
B 3843	Rowena Wheat Middlings with ground screenings not exceeding mill run	Wayland.....	11.1	15.2	4.7	7.2	\$2.35
B 3860	Rowena Wheat Middlings with ground screenings not exceeding mill run	Grand Rapids.....	11.3	15.6	4.6	7.0	39.00
B 4208	Rowena Wheat Middlings with ground screenings not exceeding mill run	Vicksburg.....	11.0	18.3	4.7	6.6	64.00
B 4849	Rowena Wheat Middlings with ground screenings not exceeding mill run	Frankfort.....	11.1	16.1	4.9	7.8	3.00
		Average.....	10.9	16.0	4.6	7.3	.....
Voigt Milling Co., Grand Rapids, Mich.							
B 3178	Crescent Brand Middlings with mill run screenings.	Hudsonville..... { G.* F.*	14.5 10.1	3.5 17.1	10.0 4.6	..... 6.5	..... 40.00
B 3422	Crescent Brand Middlings with mill run screenings.	Grand Rapids.....	10.8	15.6	4.2	6.7	2.35
B 3443	Crescent Brand Middlings with mill run screenings.	Grand Rapids.....	11.7	14.8	4.0	8.7	.....
B 3480	Crescent Brand Middlings with mill run screenings.	Grand Rapids.....	11.3	15.6	3.3	8.5	2.50
B 4612	Crescent Brand Middlings with mill run screenings.	Grand Rapids.....	9.3	16.4	4.3	7.5	48.00
B 4806	Crescent Brand Middlings with mill run screenings.	Petoskey.....	10.5	16.1	4.4	8.0	2.65
		Average.....	10.6	15.9	4.1	7.7	.....
Washburn Crosby Co., Minneapolis, Minn.							
B 3716	Wheat Flour Middlings with ground screenings not exceeding mill run	Owosso..... { G.* F.*	15.0 10.2	4.0 17.2	8.0 5.5	..... 4.4	..... 37.00
B 3382	Wheat Standard Middlings with ground screenings not exceeding mill run	Detroit..... { G.* F.*	14.0 11.0	4.0 17.6	11.0 5.4	..... 8.1	..... 35.00
B 3669	Wheat Standard Middlings with ground screenings not exceeding mill run	Lansing.....	9.6	17.4	5.3	8.1	.....
B 3744	Wheat Standard Middlings with ground screenings not exceeding mill run	Mason.....	9.6	16.9	5.3	8.5	48.00
B 3789	Wheat Standard Middlings with ground screenings not exceeding mill run	South Haven.....	11.2	16.9	5.9	8.1	.....
B 4361	Wheat Standard Middlings with ground screenings not exceeding mill run	Ishpeming.....	10.4	17.1	4.6	7.7	52.00
		Average.....	10.4	17.2	5.3	8.1	.....
WHEAT MIXED FEEDS.							
Consolidated Flour Mills Co., Hutchinson, Kansas.							
B 4479	Wheat Mixed Feed and screenings.....	Holly..... { G.* F.*	16.0 10.5	3.5 17.1	9.0 4.2	..... 9.7	..... 2.40
Duluth Superior Milling Co., Duluth, Minn.							
B 4393	Boston Mixed Feed.....	Ewen..... { G.* F.*	16.5 10.8	4.0 16.9	10.8 6.1	..... 7.6	..... 3.00
B 4961	Boston Mixed Feed.....	Port Huron.....	9.8	16.6	6.2	9.7	2.75
		Average.....	10.3	10.8	6.2	8.7	.....
The Huren Milling Co., Harbor Beach, Mich.							
B 4110	Jenks Mixed Feed.....	Carsonville..... { G.* F.*	14.0 10.9	3.5 15.4	11.5 4.3	..... 9.3	..... 2.75
B 4124	Jenks Mixed Feed.....	Harbor Beach.....	11.7	14.2	4.2	8.6	52.00
B 4959	Jenks Mixed Feed.....	Port Huron.....	9.7	15.6	4.6	9.0	2.85
		Average.....	10.8	15.1	4.4	9.0	.....
Kehlor Flour Mills, St. Louis, Mo.							
B 3788	Kehlor's Mill Feed.....	South Haven..... { G.* F.*	15.0 11.3	4.0 17.4	8.0 4.2	..... 8.5	..... 50.00
The Lindsborg Milling & Elevator Co., Lindsborg, Kansas.							
B 3464	Wheat Mixed Feed and screenings.....	Zeeland..... { G.* F.*	16.0 10.7	3.5 15.1	8.5 4.7	..... 8.7	..... 38.00
B 3849	Wheat Mixed Feed and screenings.....	Sparta.....	10.8	17.4	4.9	7.9	42.00
		Average.....	10.8	17.8	4.8	8.3	.....

*Abbreviations for Guaranteed and Found.

EXPERIMENT STATION BULLETIN.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fibre.	Price per ton or cwt.
	National Feed Co., St. Louis, Mo.						
B 4439	Wheat Mixed Feed with screenings not exceeding mill run.	Dundee..... { G.* F.*	9.8	15.0 19.2	4.0 4.5	9.0 8.6	\$2.75
	Portland Milling Co., Portland, Mich.						
B 4982	Champion Mixed Feed.....	Williamston... { G.* F.*	10.6	13.5 14.4	3.5 3.8	8.4 7.2	2.70
	Stanard Tilton Milling Co., St. Louis, Mo.						
B 4155	Wheat Mixed Feed.....	Vassar..... { G.* F.*	11.5	14.5 18.3	4.0 4.9	8.0 8.5	2.10
	F. W. Stock & Sons, Hilldale, Mich.						
B 3044	Monarch Mixed Feed.....	Kalamasoo... { G.* F.*	10.2	16.0 16.5	4.0 4.3	10.0 8.0	52.00
B 4173	Monarch Mixed Feed.....	Hilldale.....	10.6	16.6	4.3	9.0	3.85
B 4178	Monarch Mixed Feed.....	Hilldale.....	10.7	17.4	5.0	8.8	45.00
	David Stott Flour Mills, Detroit, Mich.	Average.....	10.5	16.8	4.5	8.6	
B 3512	Honest Mixed Feed.....	Detroit..... { G.* F.*	11.1	14.5 16.1	4.0 4.1	8.5 7.8	
B 3737	Honest Mixed Feed.....	Detroit.....	11.5	15.6	4.1	7.3	
	Valley City Milling Co., Grand Rapids, Mich.	Average.....	11.3	15.8	4.1	7.6	
B 3861	Rowena Cow Feed with ground screenings not exceeding mill run	Grand Rapids... { G.* F.*	11.5	15.0 15.1	4.0 4.7	8.5 8.1	38.35
B 4861	Rowena Cow Feed with ground screenings not exceeding mill run	Manistee.....	10.6	16.6	4.8	8.4	2.85
	WHEAT AND RYE MIXED FEEDS.	Average.....	11.1	15.8	4.8	8.3	
	Commercial Milling Co., Detroit, Mich.						
B 3333	Henkel's Fine White Feed.....	Detroit..... { G.* F.*	11.3	13.0 16.4	4.0 4.1	9.0 7.1	
B 3358	Henkel's Fine White Feed.....	Detroit.....	10.1	15.4	3.8	10.1	
B 3392	Henkel's Fine White Feed.....	Detroit.....	9.8	15.8	3.8	6.8	40.00
B 3508	Henkel's Fine White Feed.....	Detroit.....	11.1	15.6	4.4	7.1	34.66
B 3528	Henkel's Fine White Feed.....	Detroit.....	11.4	15.7	3.9	7.1	38.00
B 3556	Henkel's Fine White Feed.....	Detroit.....	10.9	17.1	4.5	6.4	49.00
B 4818	Henkel's Fine White Feed.....	Boyne City.....	11.9	16.3	3.8	5.7	2.90
	B. A. Eckhart Milling Co., Chicago, Ill.	Average.....	10.9	16.0	4.0	7.2	
B 4706	Wheat and Rye Flour Middlings.....	Oxford..... { G.* F.*	9.9	14.0 17.1	4.0 4.8	7.0 7.3	2.50
	RYE FEED.						
	(Rye Bran and Rye Middlings with ground screenings).						
	John P. Dousman Milling Co., DePere, Wis.						
B 4322	Rye Middlings with ground screenings not exceeding mill run.....	Cheboygan.... { G.* F.*	10.5	17.7 16.5	3.6 4.5	5.0 6.8	57.00
	Oriental Mills, Manitowoc, Wis.						
B 4873	Rye Feed.....	Ludington.... { G.* F.*	11.7	14.0 14.5	2.5 3.3	6.0 4.9	2.60
	Valley City Milling Co., Grand Rapids, Mich.						
B 3794	Rowena Rye Feed.....	Hartford..... { G.* F.*	10.6	16.0 15.1	2.7 3.2	6.3 4.9	42.00
B 3799	Rowena Rye Feed.....	Hartford.....	10.6	14.8	3.1	5.3	
B 3903	Rowena Rye Feed.....	Coopersville..	10.9	15.6	3.2	5.8	42.00
B 3907	Rowena Rye Feed.....	Hudsonville..	11.2	17.8	3.3	4.5	35.00
B 4704	Rowena Rye Feed.....	Saline.....	10.4	15.5	3.7	5.8	2.35
	Average.....		10.7	15.8	3.3	5.5	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Veigt Milling Co., Grand Rapids, Mich.						
B 4615	Crescent Brand Rye Feed.....	Grand Rapids..... { G.* F.*	8.6	15.0 15.1	3.0 3.0	6.0 5.3	\$46.00
	OAT MEAL MILL BY-PRODUCTS.						
	Armour Grain Co., Chicago, Ill.						
B 4497	Oat Feed (Composed of ground oat hulls, oat shorts, oat middlings).....	Ypsilanti..... { G.* F.*	6.5	5.0 5.7	2.0 1.9	30.0 30.7	1.50
B 4732	Oat Feed (Composed of ground oat hulls, oat shorts, oat middlings).....	Trenton.....	6.7	5.0	1.8	30.1	1.70
		Average.....	6.6	5.4	1.9	30.4	.....
	E. P. Mueller, Chicago, Ill.						
B 3827	Reground Oat Feed (ground oat hulls).....	Holland..... { G.* F.*	8.0	5.9 6.7	2.1 2.1	26.9 24.7	30.00
B 3841	Reground Oat Feed (ground oat hulls).....	Wayland.....	7.2	7.1	2.5	24.6	30.00
B 3906	Reground Oat Feed (ground oat hulls).....	Muskegon Heights.....	7.2	5.2	1.8	29.3	30.00
B 4198	Reground Oat Feed (ground oat hulls).....	Adrian.....	7.4	7.6	1.8	26.4	26.00
B 4281	Reground Oat Feed (ground oat hulls).....	Grand Rapids.....	6.4	4.8	2.0	29.0	28.00
		Average.....	7.2	6.5	2.0	26.8	.....
	The Quaker Oats Co., Chicago, Ill.						
B 3481	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Forest Grove..... { G.* F.*	8.2	5.0 5.8	2.0 1.7	28.0 25.4	32.00
B 3497	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Zeeland.....	7.7	5.5	1.5	27.0	30.00
B 3822	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Holland.....	7.4	6.8	2.0	26.7	30.00
B 4596	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	East Jordan.....	6.8	7.4	2.4	25.5	2.00
B 4932	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Pontiac.....	7.0	5.1	1.8	28.7	27.28
B 4941	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Birmingham.....	7.5	5.2	1.4	28.9	1.40
B 4990	Vim Feed (Ground oat hulls, oat shorts, oat middlings).....	Jackson.....	6.9	6.1	2.3	26.6	.....
		Average.....	7.3	6.0	1.9	27.0	.....
	BARLEY FEED.						
	The Larabee Flour Mills Corporation, Kansas City, Mo.						
B 4708	Barley Feed (Barley hulls, and barley screenings).....	Oxford..... { G.* F.*	8.4	10.5 8.9	1.7 3.3	22.7 21.1	2.28
	Pillsbury Flour Mills, Minneapolis, Minn.						
B 4218	Barley Mill Feed (Barley hulls, barley bran, barley middlings and ground barley screenings).....	St. Joseph..... { G.* F.*	10.0	8.0 13.1	2.0 3.3	20.0 11.7	60.00
B 4425	Barley Mill Feed (Barley hulls, barley bran, barley middlings and barley ground screenings).....	Morenci.....	9.6	11.3	3.2	15.7	53.00
		Average.....	9.8	12.2	3.3	13.7	.....
	Postum Cereal Co., Battle Creek, Mich.						
B 4262	Barley Bran (barley hulls).....	Battle Creek..... { G.* F.*	6.8	8.0 8.1	1.2 2.2	30.0 19.7	40.00
	Star & Crescent Milling Co., Chicago, Ill.						
B 2610	Barley Feed (Barley hulls and barley screenings).....	Marshall..... { G.* F.*	10.2	12.0 11.7	2.5 2.5	13.5 14.6	45.00
B 4168	Barley Feed (By-products from manufacture of pearled barley).....	Litchfield.....	10.7	13.3	2.5	8.5	52.50
		Average.....	10.5	12.5	2.5	11.6	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
CEREAL FOOD BY-PRODUCTS.							
J. E. Bartlett Co., Jackson, Mich.							
B 4164	Toasted Wheat Feed.....	Litchfield..... { G.*	15.0	2.0	26.0	.....	.....
B 4167	Toasted Wheat Feed.....	Litchfield..... { F.*	9.3	18.1	1.0	7.2	.....
B 4241	Toasted Wheat Feed.....	Litchfield.....	6.8	14.4	3.2	14.3	\$38.50
B 4401	Toasted Wheat Feed.....	Cadillac.....	7.3	18.2	2.8	20.4	47.00
		Grand Ledge.....	6.5	17.4	3.3	18.5	.....
		Average.....	7.5	16.5	2.8	15.1	.....
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 4265	Broken Wheat Biscuit.....	Battle Creek..... { G.*	9.3	0.8	2.4	.....	.....
		Battle Creek..... { F.*	5.1	12.3	1.3	2.9	.....
B 3741	Dried Corn Flake Feed.....	Mason..... { G.*	6.9	2.1	0.4	.....	.....
B 4266	Dried Corn Flake Feed.....	Battle Creek..... { F.*	8.5	8.3	3.0	0.7	\$3.00
B 4735	Dried Corn Flake Feed.....	Battle Creek.....	4.3	8.1	1.3	0.6	.....
		Bronson.....	7.8	8.2	1.8	0.6	2.80
		Average.....	6.9	8.2	2.0	0.6	.....
Mapl-Flake Mills, Battle Creek, Mich.							
B 4269	Cooked Grits.....	Battle Creek..... { G.*	7.0	0.6	0.2	.....	.....
		Battle Creek..... { F.*	11.9	7.9	1.0	0.7	.....
B 4271	Macaroni Feed.....	Battle Creek..... { G.*	15.0	0.2	1.0	.....	.....
		Battle Creek..... { F.*	12.4	13.7	0.5	0.2	50.00
B 4270	Mapl-Flake Feed.....	Battle Creek..... { G.*	7.7	0.6	1.7	.....	.....
		Battle Creek..... { F.*	3.7	10.7	1.4	0.9	2.25
Postum Cereal Co., Battle Creek, Mich.							
B 4260	Cooked Corn Grits.....	Battle Creek..... { G.*	6.0	0.2	2.0	.....	.....
		Battle Creek..... { F.*	11.2	7.6	0.4	0.4	40.00
B 3174	CXX Feed.....	Jamestown..... { G.*	15.0	2.0	26.0	.....	.....
B 4000	CXX Feed.....	Hastings..... { F.*	8.2	18.3	3.3	19.3	33.00
B 4004	CXX Feed.....	Devereaux.....	8.0	17.6	3.7	19.0	35.00
B 4052	CXX Feed.....	Bay City.....	7.3	18.9	3.7	18.1	.....
B 4071	CXX Feed.....	Caro.....	7.7	17.4	3.8	18.7	1.75
B 4259	CXX Feed.....	Battle Creek.....	8.4	16.9	3.1	19.5	33.00
		Battle Creek.....	8.0	17.2	3.7	15.4	33.00
		Average.....	7.9	17.7	3.6	18.3	.....
B 3490	Flaked Corn Feed.....	Vriesland..... { G.*	8.0	1.0	5.0	.....	.....
B 3998	Flaked Corn Feed.....	Nashville..... { F.*	9.0	8.3	1.0	0.5	54.00
B 4174	Flaked Corn Feed.....	Hillsdale.....	8.1	8.3	1.5	0.7	.....
B 4194	Flaked Corn Feed.....	Adrian.....	8.3	8.6	1.6	0.8	3.00
B 4261	Flaked Corn Feed.....	Battle Creek.....	7.8	8.5	1.0	0.8	54.00
		Battle Creek.....	5.5	8.3	1.1	0.8	46.00
		Average.....	7.7	8.4	1.2	0.7	.....
B 4258	Flaked Corn Offal.....	Battle Creek..... { G.*	5.0	0.5	2.0	.....	.....
		Battle Creek..... { F.*	8.5	8.1	2.0	0.9	45.00
B 4257	G. N. Feed.....	Battle Creek..... { G.*	9.0	0.5	2.5	.....	.....
		Battle Creek..... { F.*	2.0	11.7	0.8	1.2	50.00
Quaker Oats Co., Chicago, Ill.							
B 4163	Max All Feed.....	Litchfield..... { G.*	8.0	1.4	2.0	.....	.....
B 4988	Max All Feed.....	Jackson..... { F.*	6.9	8.6	1.3	1.0	57.50
		Jackson.....	7.0	8.9	1.6	1.0	70.00
		Average.....	7.0	8.8	1.5	1.0	.....
MISCELLANEOUS FEEDS.							
J. E. Bartlett Co., Jackson, Mich.							
B 4994	Linofeed (Ground flaxseed screenings and grain screenings).....	Jackson..... { G.*	15.0	8.0	19.0	.....	.....
		Jackson..... { F.*	10.7	17.8	7.5	18.6	2.00

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF FEEDING STUFFS FOR 1918-1919.—CONCLUDED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
B 3864	Bel-Car-Me Nut Butter Co., Grand Rapids, Mich. Peanut Bran.....	Grand Rapids... { G.* F.*	19.4	25.2	7.8	.....	.....
			4.9	19.4	25.2	7.8	.....
B 4608	Blue Bell Peanut Butter Co., Grand Rapids, Mich. Blue Bell Peanut Bran.....	Grand Rapids... { G.* F.*	24.0	30.2	6.8	.....	.....
			4.3	24.1	30.3	6.9	.....
B 4648	Colby Milling Co., Dowagiac, Mich. Wheat Scourings.....	Dowagiac... { G.* F.*	13.8	3.6	12.8	.....	.....
			9.4	13.1	3.6	16.4	\$28.00
B 4112 B 4963	Michigan Cereal Co., Port Huron, Mich. Pea Bran..... Pea Bran.....	Sandusky... { G.* F.* Port Huron.....	5.0	0.5	50.0	.....	.....
			9.1	15.2	1.3	33.2	2.75
			8.8	11.4	0.9	36.8	.....
		Average.....	9.0	13.3	1.1	35.0	.....
B 4777	Watson Bros., Detroit, Mich. Excelsior Stock Food (Linseed meal, corn meal, foenugreek, anise, salt, sulfur, gentian).....	Detroit..... { G.* F.*	9.2	9.5	2.0	.....	.....
			9.5	10.4	6.1	2.3	.....

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDS REQUIRING NO LICENSE.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Amendt Milling Co., Monroe, Mich.							
B 4914	Amco Middlings	Plymouth	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 17.0 \\ 16.8 \end{array} \right.$	$\left\{ \begin{array}{l} 5.0 \\ 4.7 \end{array} \right.$	$\left\{ \begin{array}{l} 8.0 \\ 6.1 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ \$3.00 \end{array} \right.$
B 4915	Barley Meal	Plymouth	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.7 \\ 11.0 \end{array} \right.$	$\left\{ \begin{array}{l} 2.1 \\ 2.1 \end{array} \right.$	$\left\{ \begin{array}{l} 4.8 \\ 4.8 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.96 \end{array} \right.$
B 4445	Norvell Rye Feed	Trenton	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 14.6 \\ 15.9 \end{array} \right.$	$\left\{ \begin{array}{l} 3.4 \\ 3.9 \end{array} \right.$	$\left\{ \begin{array}{l} 3.5 \\ 5.7 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 30.00 \end{array} \right.$
The J. E. Bartlett Co., Jackson, Mich.							
B 4986	Ground Salvage Barley	Jackson	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 9.9 \\ 15.6 \end{array} \right.$	$\left\{ \begin{array}{l} 2.6 \\ 2.1 \end{array} \right.$	$\left\{ \begin{array}{l} 7.0 \\ 3.9 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.25 \end{array} \right.$
B 4987	Salvage Wheat	Jackson	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.8 \\ 12.8 \end{array} \right.$	$\left\{ \begin{array}{l} 1.8 \\ 1.8 \end{array} \right.$	$\left\{ \begin{array}{l} 3.9 \\ 3.9 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.50 \end{array} \right.$
Bay State Milling Co., Winona, Minn.							
B 4323	Low Grade Flour	Sault Ste. Marie	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 16.0 \\ 15.8 \end{array} \right.$	$\left\{ \begin{array}{l} 4.5 \\ 4.1 \end{array} \right.$	$\left\{ \begin{array}{l} 2.0 \\ 1.2 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 50.00 \end{array} \right.$
B 4309	Winona Coarse Wheat Bran	Alpena	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 15.0 \\ 14.6 \end{array} \right.$	$\left\{ \begin{array}{l} 3.5 \\ 6.0 \end{array} \right.$	$\left\{ \begin{array}{l} 12.0 \\ 10.8 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 35.00 \end{array} \right.$
Christian Breisch Co., Lansing, Mich.							
B 3704	Choice Winter Wheat Bran	Lansing	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 13.1 \\ 13.1 \end{array} \right.$	$\left\{ \begin{array}{l} 3.5 \\ 3.2 \end{array} \right.$	$\left\{ \begin{array}{l} 10.4 \\ 9.3 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 40.00 \end{array} \right.$
B 3676	Choice Winter Wheat Bran	Lansing	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 10.4 \\ 14.8 \end{array} \right.$	$\left\{ \begin{array}{l} 3.2 \\ 3.2 \end{array} \right.$	$\left\{ \begin{array}{l} 9.3 \\ 9.3 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 40.00 \end{array} \right.$
		Average		10.0	14.0	3.4	9.9
Commercial Milling Co., Detroit, Mich.							
B 3334	Wheat Bran	Detroit	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 10.8 \\ 16.7 \end{array} \right.$	$\left\{ \begin{array}{l} 4.4 \\ 4.4 \end{array} \right.$	$\left\{ \begin{array}{l} 10.4 \\ 10.4 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 39.00 \end{array} \right.$
Eagle Roller Mills Co., New Ulm, Minn.							
B 4397	Superb Red Dog Flour	Ironwood	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 17.0 \\ 17.9 \end{array} \right.$	$\left\{ \begin{array}{l} 5.0 \\ 4.2 \end{array} \right.$	$\left\{ \begin{array}{l} 7.4 \\ 4.4 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.65 \end{array} \right.$
J. F. Eesley Milling Co., Plainwell, Mich.							
B 4647	Winter Wheat Bran	Plainwell	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 9.7 \\ 9.5 \end{array} \right.$	$\left\{ \begin{array}{l} 14.6 \\ 14.5 \end{array} \right.$	$\left\{ \begin{array}{l} 4.6 \\ 5.9 \end{array} \right.$	$\left\{ \begin{array}{l} 10.2 \\ 11.1 \end{array} \right.$
B 4649	Winter Wheat Bran	Plainwell	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 9.7 \\ 9.5 \end{array} \right.$	$\left\{ \begin{array}{l} 14.6 \\ 14.5 \end{array} \right.$	$\left\{ \begin{array}{l} 4.6 \\ 5.9 \end{array} \right.$	$\left\{ \begin{array}{l} 10.2 \\ 11.1 \end{array} \right.$
		Average		9.6	14.6	5.3	10.7
Fremo Cereal Co., Minneapolis, Minn.							
B 4989	Ground Barley	Jackson	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 12.0 \\ 11.9 \end{array} \right.$	$\left\{ \begin{array}{l} 3.0 \\ 3.1 \end{array} \right.$	$\left\{ \begin{array}{l} 9.0 \\ 7.8 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.75 \end{array} \right.$
Harris Milling Co., Mt. Pleasant, Mich.							
B 3968	Wheat Bran	Mt. Pleasant	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 9.2 \\ 13.8 \end{array} \right.$	$\left\{ \begin{array}{l} 5.2 \\ 5.2 \end{array} \right.$	$\left\{ \begin{array}{l} 12.2 \\ 12.2 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 52.00 \end{array} \right.$
B 4851	Wheat Middlings	Frankfort	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.5 \\ 14.4 \end{array} \right.$	$\left\{ \begin{array}{l} 4.3 \\ 4.3 \end{array} \right.$	$\left\{ \begin{array}{l} 6.2 \\ 6.2 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.90 \end{array} \right.$
Herried Milling Co., Herried, So. Dakota.							
B 4601	Barley Feed	Zeeland	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 10.8 \\ 12.2 \end{array} \right.$	$\left\{ \begin{array}{l} 2.5 \\ 2.5 \end{array} \right.$	$\left\{ \begin{array}{l} 6.9 \\ 6.9 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ .. \end{array} \right.$
B 4602	Fine Barley Feed	Zeeland	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.2 \\ 12.1 \end{array} \right.$	$\left\{ \begin{array}{l} 1.9 \\ 1.9 \end{array} \right.$	$\left\{ \begin{array}{l} 6.7 \\ 6.7 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ .. \end{array} \right.$
B 3462	Wheat Bran	Zeeland	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 10.8 \\ 17.3 \end{array} \right.$	$\left\{ \begin{array}{l} 4.3 \\ 4.3 \end{array} \right.$	$\left\{ \begin{array}{l} 7.3 \\ 7.3 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 38.00 \end{array} \right.$
B 3461	Wheat Middlings	Zeeland	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.4 \\ 18.3 \end{array} \right.$	$\left\{ \begin{array}{l} 5.4 \\ 5.4 \end{array} \right.$	$\left\{ \begin{array}{l} 5.1 \\ 5.1 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 40.00 \end{array} \right.$
Wm. Kelley Milling Co., Hutchinson, Kansas.							
B 3897	Wheat Bran	Muskegon	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 14.5 \\ 16.4 \end{array} \right.$	$\left\{ \begin{array}{l} 3.5 \\ 4.2 \end{array} \right.$	$\left\{ \begin{array}{l} 11.0 \\ 10.1 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 37.97 \end{array} \right.$
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 4268	Wheat Bran	Battle Creek	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 8.6 \\ 13.9 \end{array} \right.$	$\left\{ \begin{array}{l} 3.3 \\ 3.3 \end{array} \right.$	$\left\{ \begin{array}{l} 8.3 \\ 8.3 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ .. \end{array} \right.$
Millington Milling Co., Millington, Mich.							
B 4162	Wheat Bran	Millington	$\left\{ \begin{array}{l} G.* \\ F.* \end{array} \right.$	$\left\{ \begin{array}{l} 11.6 \\ 15.4 \end{array} \right.$	$\left\{ \begin{array}{l} 3.8 \\ 3.8 \end{array} \right.$	$\left\{ \begin{array}{l} 9.9 \\ 9.9 \end{array} \right.$	$\left\{ \begin{array}{l} .. \\ 2.00 \end{array} \right.$

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS.

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ANALYSES OF SEEDS REQUIRING NO LICENSE.—CONCLUDED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Lewellyn Bean Co., Grand Rapids, Mich.						
B 3839	Cull Bean Meal.....	Wayland..... { G.*	10.4	22.8	1.5	6.9	\$45.00
B 3867	Cull Bean Meal.....	Allegan..... { F.*	10.2	18.0	2.0	10.6	47.00
		Average.....	10.3	20.4	1.8	13.8	.....
	State Milling Co., Manhattan, Kansas.						
B 4096	Reliance Mixed Feed.....	Caas City..... { G.*	10.9	17.4	5.7	7.9	56.40
		..... { F.*					
	Russell-Miller Milling Co., Minneapolis, Minn.						
B 3698	Wheat Occident Feed.....	Lansing..... { G.*	.....	15.0	4.5	10.0	.....
B 4353	Wheat Occident Feed.....	Negaunee..... { F.*	9.7	17.8	5.4	7.8	38.50
B 4570	Wheat Occident Feed.....	Charlevoix.....	10.8	16.8	5.8	8.8	3.00
		.....	9.6	18.6	5.5	8.5	2.65
		Average.....	10.0	17.7	5.6	8.4	.....
	F. J. Smith, Pickford, Mich.						
B 4332	Our Own Make Bran.....	Sault Ste. Marie..... { G.*	.....	.....	.....	.....	.....
		..... { F.*	11.0	12.9	4.9	11.9	.....
B 4333	Our Own Make Middlings.....	Sault Ste. Marie..... { G.*	.....	.....	.....	.....	.....
		..... { F.*	12.5	14.9	4.5	6.2	.....
	F. W. Stock & Sons, Hillsdale, Mich.						
B 3945	Wheat Bran.....	Kalamazoo..... { G.*	.....	14.0	3.0	10.0	.....
B 4177	Wheat Bran.....	Hillsdale..... { F.*	10.3	15.4	3.4	9.6	52.00
		.....	10.6	16.7	4.7	8.5	43.00
		Average.....	10.5	16.1	4.1	9.1	.....
	Van Eyck Weurding Milling Co., Holland, Mich.						
B 3824	Buckwheat Bran.....	Holland..... { G.*	.....	.....	.....	.....	.....
		..... { F.*	12.3	20.1	4.9	8.5	30.00
B 3460	Wheat Middlings.....	Zeeland..... { G.*	.....	.....	.....	.....	.....
		..... { F.*	10.5	14.2	3.6	5.9	45.00
	Washburn-Crosby Co., Minneapolis, Minn.						
B 4324	Pure Hard Wheat Adrian Red Dog Flour.....	Sault Ste. Marie..... { G.*	.....	16.0	4.0	4.0	.....
		..... { F.*	10.3	18.9	6.8	3.8	50.00
	Watson Higgins Milling Co., Grand Rapids, Mich.						
B 3182	Wheat Bran.....	Coopersville..... { G.*	.....	.....	.....	.....	.....
B 3416	Wheat Bran.....	Grand Rapids..... { F.*	10.2	14.3	3.7	2.6	42.00
		.....	10.7	14.8	3.7	8.3	40.00
		Average.....	10.5	14.6	3.7	5.5	.....
B 3853	Wheat Middlings.....	Sparta..... { G.*
	 { F.*	12.4	16.1	4.6	6.6	44.00

*Abbreviations for Guaranteed and Found.



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BULLETIN NO. 286

JANUARY, 1920

MICHIGAN AGRICULTURAL COLLEGE

EXPERIMENT STATION



DEPARTMENT OF DAIRY HUSBANDRY



STUDIES IN THE COST OF MILK PRODUCTION

NO. 2

BY

F. T. RIDDELL and A. C. ANDERSON

**EAST LANSING, MICHIGAN
1920**



The Station

STUDIES IN THE COST OF MILK PRODUCTION. NO. 2.

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TERRITORIES STUDIED.

Studies in the cost of market milk production were begun by the Michigan Experiment Station in Kent, Allegan and Ottawa counties in 1913 and were continued throughout a period of two and one-half years. The territory studied supplied milk for the Grand Rapids trade. The results of this investigation were published in Michigan Experiment Station Bulletin No. 277.

Upon the completion of the work in the Grand Rapids field, requests came from the patrons of two condensing districts to have milk cost accounting studies made on their farms. One of these districts was in Livingston county in the vicinity of Howell and the other was in Ingham county, centered about Webberville. The work was started in both fields in the early spring of 1916 and the portion of it included in this report covers the calendar period, March 1, 1916 to March 1, 1919, at Howell, and March 1, 1916 to March 1, 1918, at Webberville. In both of these fields, the milk was sold for condensing purposes with the exception of the last two years at Howell, during which time about one-half of the farmers sold their milk to the Detroit city trade. The Howell territory is an old dairy section, milk production and receipts from dairy cattle being the chief sources of farm income.

TABLE NO. I.

	Howell (Livingston County). March, 1916 to March, 1919.	Webberville (Ingham County). March, 1916 to March, 1918.
Fields studied.....	3	2
Years studied.....	25	25
Number of years.....	1239.6	730.8
Number farms studied each year.....	413.2	365.4
Total number cows.....	16.6	14.6
Average number cows annually.....		
Average number cows per herd.....		

In the Webberville territory, dairying had not developed to so great an extent as in the Howell territory, but due to the good market conditions and general adaptability of this district for the dairy business, it is developing rapidly into a pronounced dairy section. The majority of the cattle in this territory were grades, while in the Howell section there was a large number of pure-breds.

BASIS OF STUDY.

In the collection of the data upon which this Bulletin is based, the accountants followed the general plan of Bulletin No. 277 but modified it in some particulars to comply with the outline approved by the Office of Farm Management of the United States Department of Agriculture.

The dairy cow is the unit basis of study. That is, no attempt is made to take other livestock or any other farm enterprise into consideration. Credit is given for the value of the calves as soon as the cows' milk is fit for human consumption, and all heifers are charged into the herd at their actual value as soon as they freshen. All the data presented in this bulletin are given on an average cow basis for each month, and are summarized into seasonal and yearly totals. The calendar month was used for convenience.

METHOD OF OBTAINING DATA.

Cost records were kept on twenty-five representative herds in each territory. The average size of the herds was 16.5 cows at Howell and 14.6 cows at Webberville. These herds were large enough to study with some degree of accuracy.

The College employed a field accountant who spent one day out of each calendar month throughout the year on every farm. He kept an accurate record of the kind and amount of all the feeds which were fed, and of the time spent in performing the various operations in the producing of milk. The monthly data were based on this daily record with the exception of milk sold and incidental costs. He also took into consideration all overhead costs such as investments, veterinary services, deaths, and other miscellaneous costs as well as all receipts for products. A record of the milk sold was secured each month from the dealer. From this statement was obtained the price of the milk, the total value, the cost of transportation from the farm to plant or station, and the percent of butter fat. Incidental expenses were taken from daily records kept by the farmer. These data were also checked up with the day's record taken by the accountant.

COST ITEMS.

1. Feeds:

All feeds grown on the farm and fed to dairy cattle were charged in at their market value at the farmer's barn. When grinding was done, the cost was added to the price of the feeds. All purchased feeds were charged in at their actual cost. Cartage of all feeds was figured in terms of man and horse hours and was credited to labor.

(a) Concentrates.

This item included all the home-grown grains and commercial feeds fed the dairy herd.

(b) Roughages.

All the coarse feeds such as hay, fodder, silage, and green feeds, (green corn, green alfalfa, green peas and oats, roots, etc.) come under this item.

(c) Pasture.

To determine the cost of pasture with any degree of accuracy is a difficult task and one that requires close attention. The method used was to capitalize all permanent pasture and allow 5% interest on investment and 1% for taxes, plus the fence upkeep. The average value of the pasture lands for the two territories studied was \$53.00 per acre. The value of all other pasture, obtained from meadows, etc., was based as nearly as possible on feed consumed, and was either charged in at a weekly rate or on a tonnage basis.

(d) Bedding.

A record was kept of all bedding used outside of what refuse passed through the mangers. Straw was used on all the farms, and the value placed at what it was worth at the barn.

2. Labor:

(a) Man Labor.

This includes all the time spent in caring for the dairy herd, and is divided under the following headings: Production Labor, Handling Milk and Miscellaneous Labor. These items have been divided into two classes: (1) Labor performed by owner or operator, and (2) Labor performed by hired help. Such labor as has been performed by the family other than the owner or operator has been classified in with the hired help. However, there was a very small amount of this class of labor. The rate of pay for hired help was that actually paid on the several farms. The owner or operator is a more competent laborer as a rule and, therefore, is allowed a somewhat higher wage than that paid the hired help.

(b) Horse Labor.

Horse labor is divided into two classes, hauling feeds and incidental labor. Hauling milk is another big item, part of which should come under horse labor, but due to the fact that nearly all the milk was

hauled in large routes by hired milk haulers under the direction of the milk plants, it is impossible to give this item in terms of hours.

(c) Hauling Milk.

As stated in the preceding paragraph, nearly all milk was hauled by large route wagons under the direction of the milk plant. The cost of hauling was deducted from the farmer's monthly milk statement.

3. Other Costs.

Other costs cover a number of items and are listed under the following headings:

(1) Taxes, Interest and Depreciation on the Herd.

An inventory was taken of each herd at the beginning of the year, and if any changes were made as to the number of cows with their values, it was noted by the accountant and correction was made. Pure-bred cattle were charged as high grades, for the pure-bred business was not considered in this work, due to the fact that only the cost of milk production was under consideration. The charges were divided as follows: Interest, 6%; taxes, 1%, and depreciation, 5%. The tax rate is lower than the average assessed tax rate, but the valuations are higher than most assessors value cattle, and so balances in the end.

There are different methods of determining the depreciation of cattle. One is to take an inventory at the beginning and again at the end of the year, the difference of these two values being depreciation or appreciation. Another method is to take the average productive period of the cow's life, which is from six to seven years, and divide this into the difference between her dairy value and beef value, which would give her yearly depreciation. The following expresses this as a formula.

$$\text{Depreciation} = \frac{\text{Dairy value} - \text{beef value}}{\text{Productive life of cow}}$$

The average productive life of the dairy cow is affected in many ways, such as by udder troubles, abortion, failure to breed, accidents, sickness, etc. The average value of the cows in the Howell territory was \$107.74 and the average beef value was \$70.00. The average cow's beef value was, therefore, \$37.74 less than their dairy value. One-seventh of \$37.74 is \$5.39, the depreciation for one year per cow, and amounts approximately to 5% of the inventory value. This compares very closely with the data taken at Grand Rapids, (Bulletin No. 277). The Webberville data were also figured at this same rate. This makes a total charge of 12% for taxes, interest, and depreciation on the herd.

In the above figures no account has been taken of losses due to death. These are entered under a separate item.

(2) Losses Due to Death.

No herd is immune from death losses. Accidents, tuberculosis, and other diseases help to increase the death rate. The difference between the inventory value of the animal and the amount received for hide or carcass was charged under losses due to death.

(3) Taxes, Interest, Insurance, and Depreciation on Buildings.

The valuation of the dairy plant on each farm was determined by a committee of three men who placed values on the portion of the dairy

barn, yardage, milk house, ice house and water supply, that was used for dairy purposes, including the silo and sufficient space to store all dairy feeds. A charge of 10% was made on the inventory value of these items which is divided as follows: Interest, 6%; taxes, 1%; insurance, 0.4%, and depreciation, 2.6%.

(4) Interest and Depreciation on Equipment.

Under this heading comes milking machines, gasoline engines, separators, cans, pails, coolers, heaters, shovels, forks, carts and many other small items used in the dairy. Six percent interest was charged on the value of this equipment. The rate of depreciation varied greatly on different items of equipment. Milking machines, engines, and separators last much longer than milk cans, pails, coolers, etc., and were allowed a proportionate rate. The rate of depreciation charged at Howell averaged 12.6% which, combined with 6% interest, makes a total charge of 18.6% for interest and depreciation on equipment, while at Webberville the total was 18%.

(5) Veterinary Services and Drugs.

Fees for veterinary services and the cost of drugs, including disinfectants used in the dairy, come under this heading.

(6) Sire Costs.

Sire costs are less tangible than general herd costs. Such data as were kept showed that the cost of keeping the sire was approximately equal to the value of the calves at four days old. In the Howell district nearly every farmer kept a bull, thus making the cost higher than it is in some sections where fewer bulls are kept. In this bulletin sire costs and value of calves at birth are allowed to balance each other.

(7) Miscellaneous Costs.

Under this heading come a large number of items such as gasoline, lubricating oil, fuel for the boiler or heater, washing powder, ice, repairs, dairy literature, association fees, and many other small expenses.

(8) Managerial Ability and Business Risks.

No enterprise can be operated successfully without skilled supervision. The dairy business is of such a nature that it requires the closest of attention at all times throughout the year. A few hours' neglect means a lessening of production, and in time, a failure of the business. The manager must keep in close touch with each and every operation. He must look after the rations for the dairy herd, the selection and purchase of feed, the selecting of the herd sire, the breeding records, the buying and selling of cattle and the general supervision of all help. While in many cases the manager does all or a part of the ordinary dairy work such as milking, feeding, cleaning barns, etc., his time has not been figured in for managerial operations on the time unit basis.

The dairyman should also be entitled to a sufficient amount to cover all business risks such as a temporary loss of market due to the shortage of material in the manufacture of the finished products, strikes, and in some cases where plants discontinue the business for the time being. For this added effort and ability expended over that of ordinary labor and unavoidable risks, 10% of all other expenses have been allowed.

CREDITS.

The following items are classed as credits:

(1) **Milk**, (2) **Manure**, (3) **Feed Bags**, (4) **Calves**.

(1) **Milk.**

The largest credit item is milk which is divided as follows: **Milk** sold, milk used on the farm, and milk not taken by the plant.

A record was kept of all the milk used on the farm and credited to the dairy at prevailing prices less the cost of hauling. Returned milk was valued at what it was worth for stock feeding. A record of the milk sold was taken off the monthly milk statement given the farmer by the manager of the milk plant.

(2) **Manure.**

The amount of manure credited to the cow for the year was 8 tons for every 1,200 pounds of animal weight. This was divided up according to the seasons. During the winter period (October 16 to May 15) twice as much manure was credited to the cow per month as during the summer season (May 15 to October 16). During the winter when the cows are fed large quantities of rich grains, the manure is richer in fertilizing ingredients than during the summer period. Furthermore, it is true that there is a greater loss in the summer than in the winter.

All manure was valued in the pit or spreader at the barn and was charged in at \$2.00 per ton for the entire yearly production with the exception of the first year when it was charged at \$1.50 per ton.

(3) **Feed Bags.**

This is a very small item and was not kept separate until the last year's work at Howell. Previous to this, the price of feed bags when sold or returned, was deducted from the cost of the feed purchased.

(4) **Calves.**

The raising of calves was not considered as a part of the milk cost, therefore, they were charged off the list as soon as the dams' milk was good for human consumption. When whole milk was fed to calves it was charged and classed under the heading "Milk Used on the Farm." As previously stated under "Sire Costs," calves and sire costs offset one another.

THE DATA.

The data are presented on the basis of the average per cow of the entire field, and are given for each calendar month as well as by the season and the year. No attempt will be made to go into individual herd records in this bulletin, due to the large amount of space they would require. Nevertheless all these herd records are on file and may form parts of future publications.

The winter season covers the winter feeding period (October 15 to May 16) and the summer season covers the summer feeding period or pasture season (May 16 to October 15). These dates were selected as being the nearest point of demarcation between the two seasons.

Feed Costs.

Feeds constitute the largest item of expense in the dairy business, comprising nearly one-half (48.9% at Howell and 46.4% at Webberville) of the total cost of milk production.

Tables II and III give the amount of feed fed per cow for each month as well as for the winter and summer season and the yearly total.

TABLE II.—AVERAGE MONTHLY FEED REQUIREMENT PER COW AT HOWELL.

Three bottom lines of the table show the amounts of feed for winter and summer seasons and the yearly total.

Months.	Home grown grains.	Commercial feeds.	Hay.	Other dry roughage.	Silage.	Soiling crops and other succulent feeds.	Pasture.	Bedding used.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	days	lbs.
March.....	90	151	378	103	1074	1	.....	127
April.....	72	131	414	53	944	5	.....	123
May.....	47	76	203	37	436	5	18	68
June.....	17	41	31	.....	52	1	30	17
July.....	10	38	45	1	25	6	31	4
August.....	19	41	65	7	69	27	31	8
September.....	35	54	86	7	174	164	30	27
October.....	54	84	145	49	437	127	20	64
November.....	85	109	267	129	843	40	.....	103
December.....	84	139	330	159	1026	54	.....	127
January.....	82	172	327	156	1118	22	.....	128
February.....	95	142	297	124	995	8	.....	123
Winter season.....	573	938	2305	791	6687	219	8	822
Summer season.....	117	240	283	34	506	241	152	97
Yearly.....	690	1178	2588	825	7193	460	160	919

TABLE III.—AVERAGE MONTHLY FEED REQUIREMENT PER COW AT WEBBERVILLE.

Three bottom lines of the table show the amounts of feed for winter and summer seasons and the yearly total.

Months.	Home grown grains.	Commercial feeds.	Hay.	Other dry roughage.	Silage.	Soiling crops and other succulent feeds.	Pasture.	Bedding used.
	lbs.	lbs.	lbs.	lbs.	lbs.	days	lbs.	lbs.
March.....	101	110	360	132	989	.....	.....	124
April.....	98	72	354	82	834	.....	.....	104
May.....	40	28	94	1	267	.....	16	41
June.....	10	9	13	.....	38	.....	30	9
July.....	5	7	23	.....	58	6	31	3
August.....	3	8	48	4	92	9	31	1
September.....	18	16	58	37	120	100	30	5
October.....	43	34	122	98	336	105	15	41
November.....	48	51	212	236	785	38	.....	88
December.....	58	70	317	212	1078	15	.....	122
January.....	65	94	306	226	1140	.....	.....	137
February.....	72	81	320	149	1006	.....	.....	120
Winter season.....	499	521	2045	1100	6315	88	.....	763
Summer season.....	62	59	182	77	427	185	153	32
Yearly.....	561	580	2227	1177	6742	273	153	795

The average amount of grain fed per cow per year at Howell was 1,868 pounds, of which 37%, or 690 pounds, was home-grown. At Webberville 1,141 pounds of grain were fed per cow, of which 49.2%, or 561 pounds, was home-grown. The home-grown grains consisted of oats, corn, and barley with the amounts of each in the order given.

The price of silage was based on the cost of growing and harvesting the crop. From records kept on 50 farms in 1918 it was shown that the average cost equalled \$8.46 per ton. This high cost is attributed largely to the low tonnage yield for that year, due to a very unfavorable corn season. The prices of silage varied from \$4.40 per ton in 1916 to \$8.46 per ton in 1918 in the two districts.

The average length of time the cattle were on pasture was 157.2 days, costing an average of \$7.57 at Howell and \$8.20 at Webberville per cow per year. As a whole the Webberville district furnished more abundant pasture, thus cutting down on the amount of supplementary feed fed during the summer season as compared with the Howell territory. As previously stated, the cost of all permanent pasture was based on the capitalized value of the land, allowing 5% for interest and 1% for taxes, plus the upkeep of the fences. All pasture secured from meadows or fields not classed as permanent pasture was charged in according to the amount of feed furnished, either at a weekly rate or on a tonnage basis.

The large increase in cost of feeds is attributed to the world war which caused a general upward trend for all commodities. The increased cost of silage in 1918 was due to the poor corn season for that year, resulting in a very light tonnage of silage per acre. It will be noted that the feed cost per cow at Howell was greater than at Webberville. This is due to the fact that the larger and heavier producing cows

at Howell required more feed; and also that more commercial feeds, which are higher priced than the home-grown grains, were fed.

Labor Costs.

Labor is the second largest item in the cost of milk production. A detailed record of the labor was kept which was divided as follows: Production Labor, Handling Milk, and Miscellaneous Labor. These items are still further divided into two classes. (1) labor performed by the owner or operator, (2) labor performed by hired help. At Howell the average production labor per cow was 136.4 hours, handling milk 3.1 hours, while the miscellaneous labor amounted to 7.6 hours, making a total of 147.1 hours for the year. Of the total amount, 43.6% or 64.1 hours, was spent by the owner or operator.

The total time spent at Webberville amounted to 116.7 hours per cow per year, of which 58.0% was performed by the owner or operator.

TABLE IV.—AVERAGE MONTHLY LABOR REQUIREMENT PER COW AT HOWELL.
Three bottom lines of the table show the labor requirement for winter and summer seasons and yearly total.

Month.	Production labor.	Handling milk.	Miscellaneous labor.	Labor performed by owner or operator.	Labor performed by hired help.	Total man labor.	Horse labor.
	Hours	Hours	Hours	Hours	Hours	Hours	Hours
March.....	13.5	0.4	0.9	6.2	8.6	14.8	1.0
April.....	12.5	.4	.9	5.6	8.2	13.8	.8
May.....	12.5	.3	.5	5.6	7.7	13.3	.5
June.....	10.0	.2	.4	4.7	5.9	10.6	.3
July.....	9.1	.3	.4	4.0	5.8	9.8	.2
August.....	8.2	.3	.3	3.8	5.0	8.8	.3
September.....	7.5	.2	.5	3.4	4.8	8.2	.4
October.....	9.6	.2	.6	4.5	5.9	10.4	.6
November.....	11.9	.2	.7	5.9	6.9	12.8	.8
December.....	13.6	.2	.8	6.8	7.8	14.6	.9
January.....	14.7	.2	.8	7.2	8.5	15.7	1.0
February.....	13.3	.2	.8	6.4	7.9	14.3	.9
Winter season.....	91.5	1.9	5.7	43.6	55.5	99.1	6.1
Summer season.....	44.9	1.2	1.9	20.5	27.5	48.0	1.6
Yearly.....	136.4	3.1	7.6	64.1	83.0	147.1	7.7

TABLE V.—AVERAGE MONTHLY LABOR REQUIREMENT PER COW AT WEBBERVILLE.

Three bottom lines of the table show the labor requirement for winter and summer seasons and yearly total.

Month.	Production labor.	*Handling milk.	Miscellaneous labor.	Labor performed by owner or operator.	Labor performed by hired help.	Total man labor.	Horse labor.
	Hours	Hours	Hours	Hours	Hours	Hours	Hours
March.....	10.4	1.0	0.9	7.5	4.8	12.3	.78
April.....	9.6	1.0	.8	6.6	4.8	11.4	.69
May.....	8.0	1.2	.7	5.4	4.5	9.9	.32
June.....	7.3	1.3	.4	4.9	4.1	9.0	.10
July.....	6.4	1.3	.5	4.5	3.7	8.2	.09
August.....	5.2	1.1	.4	3.8	2.9	6.7	.10
September.....	5.3	.9	.5	3.9	2.8	6.7	.19
October.....	6.6	1.1	.7	4.8	3.6	8.4	.29
November.....	7.7	1.0	.7	5.8	3.6	9.4	.35
December.....	9.2	1.1	.8	6.4	4.7	11.1	.42
January.....	10.1	1.2	1.0	7.1	5.2	12.3	.51
February.....	9.1	1.2	1.0	7.0	4.3	11.3	.49
Winter season.....	64.3	7.7	6.0	45.7	32.3	78.0	3.75
Summer season.....	30.6	5.7	2.4	22.0	16.7	38.7	.57
Yearly.....	94.9	13.4	8.4	67.7	49.0	116.7	4.32

*Includes time spent in cleaning utensils.

The price of common labor was based on what was actually paid the farm laborer each month throughout the year.

The cost of common labor rose steadily during the period which was covered by these studies, increasing from \$0.17 to \$0.202 in two years at Webberville, and from \$0.178 to \$0.232 per hour during the three years at Howell.

TABLE VI.—AVERAGE HOURLY LABOR PRICE FOR EACH YEAR STUDIED AT HOWELL AND WEBBERVILLE.

Year.	1916-17.		1917-18.		1918-19.	
	Owner's or operator's labor.	Common labor.	Owner's or operator's labor.	Common labor.	Owner's or operator's labor.	Common labor.
Howell.....	per hr. \$0 25	per hr. \$0 178	per hr. \$0 30	per hr. \$0 204	per hr. \$0 35	per hr. \$0 232
Webberville.....	0 25	0 170	0 30	0 202		

The owner or operator is allowed a higher rate of pay than that of the common laborer because of greater efficiency in performing the same class of work, or in other words, he is a higher paid hired man. The kind of labor performed by the owner or operator is of the same sort as that done by the common laborer and this extra compensation does not

cover any time spent in managing the business. An extra allowance is made for this class of labor and comes under the heading "Managerial Ability and Risks."

While the labor requirement per cow when compared with records taken in other territories, is low, it was possible to give the cattle reasonably good care with the time spent. However, at Webberville, no doubt more time could have been spent to advantage.

The amount of horse labor in these fields was not large, being an average of 7.7 hours at Howell and 4.3 hours at Webberville per cow for the year. Most of the horse labor was spent in hauling feeds. A flat rate of ten cents per hour for the first year and fifteen cents per hour for the last two years was charged against horse labor, amounting to \$1.01 at Howell and \$0.53 at Webberville per cow per year. As already stated, the time used in hauling milk was not taken into consideration (with the exceptions of a few cases where farmers hauled their own milk) because nearly all the farmers hired their milk hauled at a definite rate. As shown in Table VII there was a steady and marked increase in the cost of hauling milk.

TABLE VII. COST OF HAULING MILK PER COW AID PER HUNDRED WEIGHT AT HOWELL AND WEBBERVILLE.

Year.	1916-1917.		1917-18.		1918-19.	
	Per Cow.	Per Cwt.	Per Cow.	Per Cwt.	Per Cow.	Per Cwt.
Howell.....	\$7.84	\$.140	\$9.77	\$.176	\$12.31	\$.221
Webberville.....	\$7.63	\$.144	\$9.10	\$.173	.....	.....

As a whole, milk hauling was done very economically in these two fields and for much less than would have been the case, had the farmers been compelled to haul their own milk.

Other Costs.

Under this heading comes the investment charges in cattle, buildings, and equipment; losses due to death; veterinary services and drugs; sire costs; miscellaneous costs; and charges for management and risks. A total summary of these costs is given in Tables VIII and IX. In order to cut down on space these items are not given separately in monthly cost tables, but are discussed separately under their proper headings.

TABLE VIII.—FEED, LABOR AND OTHER COSTS BY THE MONTH PER COW AT HOWELL.

The three bottom lines of the table show the costs for winter and summer seasons and the yearly totals.

Year.	1916-17.				1917-18.				1918-19.			
	Feed costs.	Labor costs.	Other costs.	Total costs.	Feed costs.	Labor costs.	Other costs.	Total costs.	Feed costs.	Labor costs.	Other costs.	Total costs.
March.....	\$8 21	\$4 00	\$4 08	\$16 29	\$9 00	\$4 55	\$4 60	\$18 15	\$15 47	\$5 27	\$5 98	\$26 42
April.....	8 01	3 90	3 74	15 65	8 47	4 22	4 59	17 28	15 57	4 89	5 18	25 61
May.....	5 66	3 47	3 51	12 64	6 11	4 23	4 27	14 61	17 66	5 07	4 18	26 91
June.....	3 31	3 00	3 38	9 69	3 53	3 92	4 02	11 47	4 26	3 92	4 23	12 43
July.....	2 47	2 58	3 43	8 48	2 56	3 19	3 83	9 58	3 66	3 60	4 13	11 39
August.....	2 57	2 30	3 15	8 02	2 67	2 50	3 50	8 67	4 32	3 23	4 32	11 87
September.....	3 35	2 14	3 21	8 70	3 38	2 17	3 79	9 34	6 37	3 18	5 06	14 61
October.....	4 82	2 78	3 35	10 95	6 65	3 16	4 25	14 06	8 52	3 99	4 75	17 26
November.....	6 75	3 36	4 32	14 43	10 31	3 81	4 64	18 76	12 80	5 11	5 41	23 32
December.....	7 52	3 79	4 78	16 09	13 52	4 78	4 95	23 25	16 19	5 76	6 05	28 00
January.....	8 80	4 25	5 43	17 48	14 90	5 17	5 54	25 61	16 94	6 13	5 74	28 81
February.....	8 34	3 93	4 13	16 40	13 28	4 57	5 10	22 95	14 83	5 97	5 41	26 21
Winter Season....	\$54 67	\$26 50	\$29 12	\$110 29	\$77 52	\$30 93	\$33 84	\$142 29	\$99 28	\$38 51	\$38 35	\$176 14
Summer Season...	15 14	13 00	16 39	44 53	16 86	15 34	19 24	51 44	25 31	17 61	22 28	65 20
Yearly.....	69 81	39 50	45 51	154 82	94 38	46 27	53 08	193 73	124 59	56 12	60 63	241 34

*Includes cost of all feeds and bedding.

†Includes cost of man labor, horse labor and hauling milk.

‡Includes all investment and depreciation charges on cattle, buildings, and equipment, also losses due to deaths, veterinary services and drugs, miscellaneous costs, and for managerial ability and risks.

TABLE IX.—FEED, LABOR AND OTHER COSTS BY THE MONTH PER COW AT WEBBERVILLE.

The three bottom lines of the table show the costs for winter and summer seasons and the yearly total.

Year.	1916-17.				1917-18.			
Month.	¹ Feed Costs.	¹ Labor Costs.	² Other Costs.	Total Costs.	¹ Feed Costs.	¹ Labor Costs.	² Other Costs.	Total Costs.
March.....	\$7 44	\$3 78	\$3 29	\$14 51	\$8 04	\$3 99	\$3 79	\$15 82
April.....	5 90	3 31	3 19	12 40	7 70	3 87	3 78	15 35
May.....	3 09	3 08	2 91	9 08	4 54	3 36	3 76	11 66
June.....	2 24	2 65	2 71	7 60	3 11	3 09	3 52	9 72
July.....	1 73	2 14	2 68	6 55	2 77	2 79	3 55	9 11
August.....	1 56	1 85	2 45	5 86	2 41	2 14	3 25	7 80
September.....	1 93	1 77	2 53	6 23	2 95	2 20	3 27	8 42
October.....	3 20	2 23	2 93	8 36	4 98	2 77	3 51	11 26
November.....	5 11	2 52	3 00	10 63	8 34	3 37	4 27	15 98
December.....	6 33	3 10	3 85	12 78	11 82	3 94	4 37	20 13
January.....	7 33	3 43	3 59	14 35	12 95	4 45	4 54	21 94
February.....	6 83	3 30	3 64	13 77	12 27	4 14	4 57	20 98
Winter Season.....	\$40 68	\$22 26	\$22 93	\$85 87	\$66 87	\$27 24	\$29 07	\$123 18
Summer Season.....	12 01	10 90	13 34	36 25	15 01	12 87	17 11	44 99
Yearly.....	52 69	33 16	36 27	122 12	81 88	40 11	46 18	168 17

¹Includes cost of all feeds and bedding.

²Includes cost of man labor, horse labor, and hauling milk.

³Includes all investment and depreciation charges on cattle, buildings, and equipment, also losses due to deaths, veterinary services and drugs, miscellaneous costs, and for managerial ability and risks.

INTEREST, TAXES, AND DEPRECIATION ON CATTLE.

There has been a general trend of increased values on all the investments during the three years covered by this Bulletin. Cattle increased in value per cow from \$99.17 in 1916-17 to \$114.50 in 1918-19 at Howell, and at Webberville, from \$67.08 in 1916-17 to \$97.42 in 1917-18. On these investments 12% was charged (page 6) with the exception of the last year at Howell when 13.0% was charged, making an average investment charge of \$13.31 per cow at Howell and \$9.87 at Webberville.

LOSSES DUE TO DEATH.

Death losses were not figured under the heading of depreciation, as they have been by some investigators, but were reported under a separate heading. The losses due to death at Howell amounted to \$1.70 per cow, or 1.58% of the total inventory value of the herds. 2% of the cows died in this territory. At Webberville, slightly less than one per cent of the cows died, amounting to a loss of \$0.65 per cow, or .79% of the inventory value of the herds.

INTEREST, TAXES, INSURANCE AND DEPRECIATION ON BUILDINGS.

Building costs varied greatly on the various farms, averaging \$134.93 per cow at Howell and \$113.95 at Webberville. On this investment a total charge of 10% was levied (page 6), amounting to an average for the three years of \$13.49 at Howell, and \$11.40 for the two years at Webberville.

TAXES, INTEREST, AND DEPRECIATION ON EQUIPMENT.

As previously stated (page 7), equipment covers milking machines, gas engines, separators, cans, pails, coolers, shovels, forks, carts, etc. These items were inventoried at \$13.77 per cow at Howell and at \$16.94 at Webberville. Thirty-four farms out of the fifty studied had milking machines, thus increasing the cost of equipment materially. On investments of this sort, 18.6% was charged at Howell, making a total cost of \$2.56 per cow for the year. At Webberville 18% was charged on the investment, which amounted to \$3.05 per cow per year.

VETERINARY SERVICES AND DRUGS.

This item of expense amounts to an average of \$1.02 at Howell and \$0.35 at Webberville per cow per year.

SIRE COSTS.

The work done in keeping the records of sire costs was not sufficient to warrant the use of any data of this sort in this Bulletin. The same method was, therefore, used as was given in Bulletin No. 277 of this Station, that is, sire costs were offset by calves at birth or at the age when their dams' milk is good for human consumption. All sires used at Howell were pure-bred Holsteins, and at Webberville pure-bred Holstein sires predominated.

MISCELLANEOUS COSTS.

These costs cover a large number of minor items which are discussed on page 7. At Howell the miscellaneous costs amounted to \$2.64 per cow in 1916-17 and \$3.66 in 1918-19, and at Webberville the average cost was \$2.31 per cow in 1916-17 and \$3.14 in 1917-18.

MANAGERIAL ABILITY AND RISKS.

Article 8 (page 7) gives a full description of this item, which is charged at 10% of all the total costs entering into milk production and amounting to an average of \$17.87 at Howell and \$13.19 at Webberville per cow per year. It has been figured that where herds are of sufficiently large size to employ a manager to devote his full time to the dairy, it would take the entire amount of this managerial charge to pay him for his services above the cost of common labor.

Tables VIII and IX give a general summary of all costs for each month as well as for the winter and summer seasons and for the yearly total. During the three years studied at Howell, there was a rapid increase in cost due to the war conditions. In 1916-17, which might be called the pre-war period, the costs per cow were \$154.82, while during the following two years the costs per cow were \$193.73 and \$241.34 respectively, thus increasing the costs of the last year over the costs of the first year an amount equaling \$86.52. The cost of feeds increased 78.4%, labor 42.1%, and the other costs 33.2% or a total increase of 55.9%.

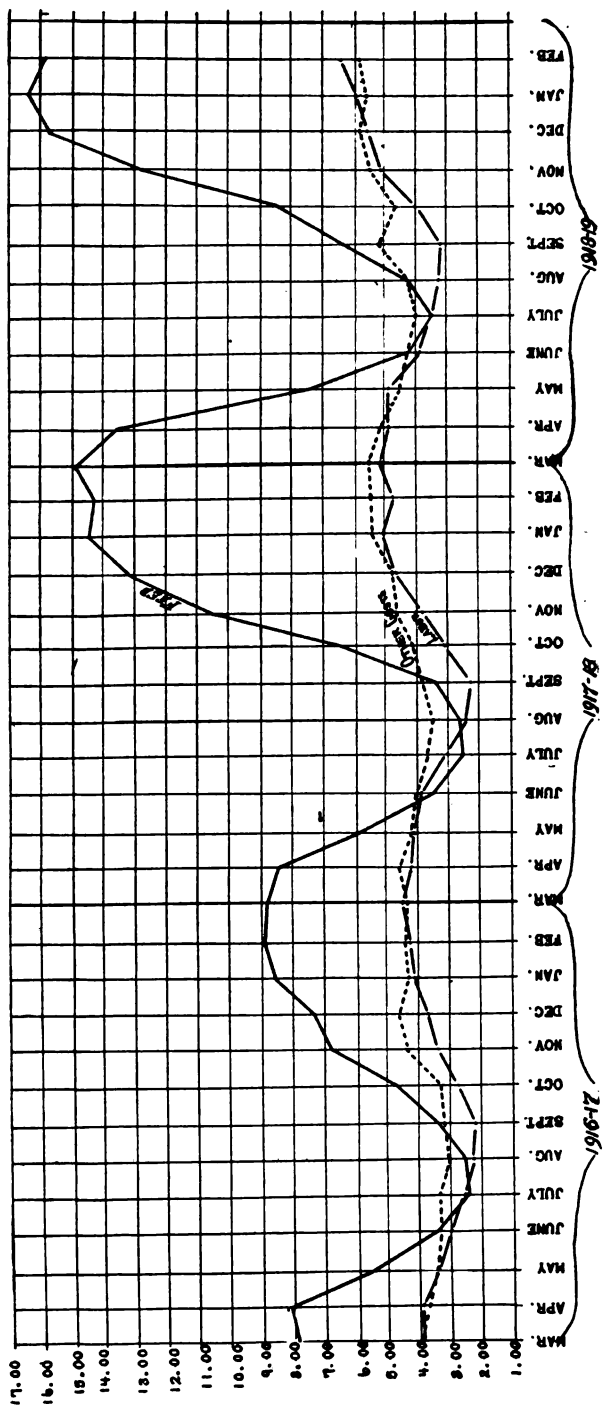


FIG. 1. AVERAGE COST OF FEED, LABOR AND OTHER COSTS PER COW BY THE MONTH AT HOWELL.

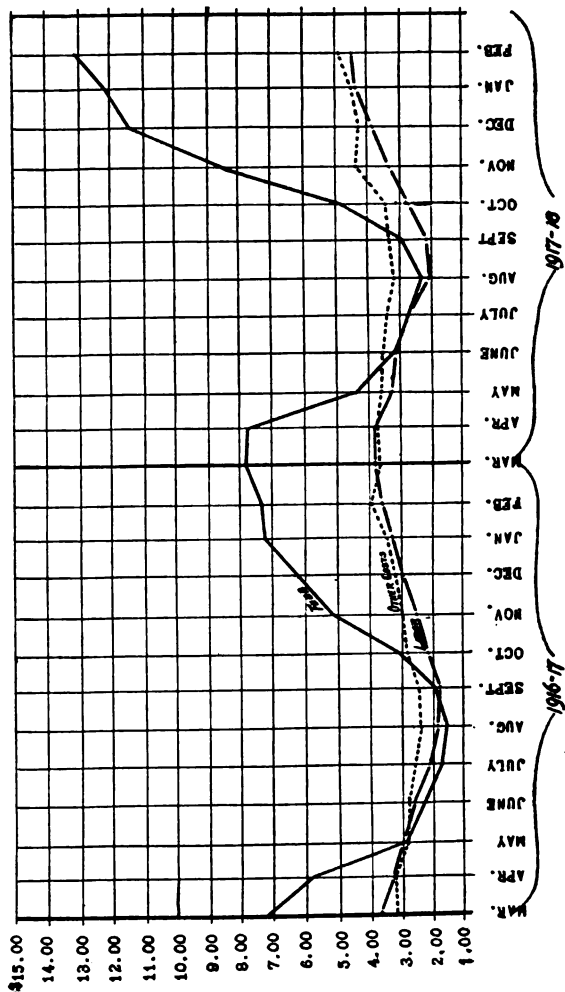


FIG. II. AVERAGE COST OF FEED, LABOR AND OTHER COSTS PER COW BY THE MONTH AT FERNHILL.

At Webberville the total gross cost was \$122.12 per cow for the first year and the last year the costs were \$168.17, or an increase of 37.7%.

TABLE X.—AN AVERAGE PERCENTAGE OF FEEDS, LABOR, AND OTHER COSTS FOR EACH SEASON AND THE YEARLY TOTAL FOR HOWELL AND WEBBERVILLE.

Season.	Howell Territory. (3 year average)			Webberville Territory. (2 year average)		
	Winter Season.	Summer Season.	Yearly.	Winter Season.	Summer Season.	Yearly.
Feeds.....	54.0%	35.6%	48.9%	51.4%	33.3%	46.4%
Labor.....	22.4%	28.5%	24.1%	23.7%	29.2%	25.2%
Other Costs.....	23.6%	35.9%	27.0%	24.9%	37.5%	28.4%
Total.....	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table X shows how the various costs were distributed for each season and the year. As a whole, the per cent of feed, labor and other costs are quite uniform in the two fields studied. At Howell, feeds represented 48.9% of the yearly cost, while at Webberville, they amounted to 46.4% of the yearly cost.

MILK PRODUCTION AND DISPOSAL.

The heavier milk production in both localities was during the winter months which can be attributed to the large percentage of the fall freshened cows. The average production in the two fields for the winter period per cow per month was 631 pounds and for the summer period, 444 pounds or approximately two-thirds of the flow of the winter months.

At Howell a total of 4,766 pounds of milk was produced during the seven winter months, and 2,445 pounds in the five summer months, or a total of 7,211 pounds of milk testing 3.35% per cow per year for the three years' average. Of the total milk produced, 77.5% was sold, 22.2% used on the farm, and .3% was returned from the factory and used on the farm for feeding purposes.

TABLE XI.—MONTHLY MILK PRODUCTION AND DISPOSAL PER COW AT HOWELL.

The three bottom lines of the table show the milk production and disposal for winter and summer seasons, and yearly total.

Year.	1916-17.				1917-18.			
Month.	Milk sold. lbs.	Milk used on farm. lbs.	Milk returned from plant. lbs.	Total milk produced. lbs.	Milk sold. lbs.	Milk used on farm. lbs.	Milk returned from plant. lbs.	Total milk produced. lbs.
March.....	625	102	.....	727	620	142	0.6	763
April.....	597	98	.9	696	551	154	1.7	707
May.....	627	138	4.0	769	602	155	1.5	757
June.....	565	125	1.7	692	580	122	4.2	706
July.....	359	114	18.9	492	389	109	2.8	501
August.....	274	90	1.3	365	239	103	1.5	344
September.....	217	93	.9	311	206	97	.....	303
October.....	287	143	.7	431	298	107	.7	406
November.....	387	148	.....	535	409	133	1.3	543
December.....	503	153	.....	656	539	145	2.4	686
January.....	609	147	.....	756	595	165	.....	760
February.....	568	143	.....	711	541	133	1.1	675
Winter Season.....	3,745	939	1.0	4,685	3,711	1,012	6.0	4,729
Summer Season.....	1,873	555	27.4	2,455	1,858	553	10.7	2,422
Yearly.....	5,618	1,494	28.4	7,140	5,569	1,565	16.7	7,151

	1918-19.				Three year average, 1916-19.			
Month.....	Milk sold. lbs.	Milk used on farm. lbs.	Milk returned from plant. lbs.	Total milk produced. lbs.	Milk sold. lbs.	Milk used on farm. lbs.	Milk returned from plant. lbs.	Total milk produced. lbs.
March.....	582	144	4.1	730	609	129	1.6	740
April.....	557	131	3.2	691	568	128	1.9	698
May.....	577	149	6.6	733	602	147	4.0	753
June.....	517	166	3.0	686	554	138	2.9	695
July.....	352	146	1.7	500	367	123	7.4	497
August.....	247	120	1.0	368	253	104	1.3	358
September.....	243	108	.5	352	222	99	.6	322
October.....	326	125	.....	451	304	125	.5	429
November.....	402	160	.2	562	399	147	.5	547
December.....	534	169	.....	703	525	156	.8	682
January.....	627	175	1.1	803	611	162	.4	773
February.....	617	149	.5	766	575	142	.5	717
Winter Season.....	3,794	1,078	13.3	4,885	3,750	1,009	6.8	4,766
Summer Season.....	1,787	664	8.6	2,460	1,839	591	15.5	2,445
Yearly.....	5,581	1,742	21.9	7,345	5,589	1,600	22.3	7,211

TABLE XII.—MONTHLY MILK PRODUCTION AND DISPOSAL PER COW AT WEBBERVILLE.

The three bottom lines of the table show the milk production and disposal for winter and summer seasons and yearly total.

Year.	1916-17.				1917-18.				Two year average 1916-18.			
	Milk sold.	Milk used on farm.	Milk returned from plant.	Total milk produced.	Milk sold.	Milk used on farm.	Milk returned from plant.	Total milk produced.	Milk sold.	Milk used on farm.	Milk returned from plant.	Total milk produced.
Month.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
March.....	609	73	.....	682	612	66	0.9	679	610	70	0.4	681
April.....	539	68	0.6	608	560	69	.....	629	550	69	.3	619
May.....	610	53	.9	664	572	50	.....	623	591	51	.7	643
June.....	507	65	5.2	577	501	41	5.2	547	504	53	5.2	562
July.....	339	53	3.5	396	321	40	4.9	366	330	47	4.2	381
August.....	237	51	.8	289	212	34	1.2	247	225	42	1.0	268
September.....	224	64	5.5	288	211	60	.....	271	218	62	.3	280
October.....	281	85	1.5	367	300	73	.....	373	290	79	.7	370
November.....	377	79	.3	456	376	68	.....	444	377	73	.2	450
December.....	470	72	.....	551	486	65	.....	551	482	69	.....	551
January.....	570	77	.....	647	552	76	.....	628	561	76	.....	637
February.....	539	53	.....	592	552	67	.....	619	545	60	.....	605
Winter Season.....	3,552	491	1.7	4,045	3,606	477	.9	4,084	3,579	484	1.3	4,064
Summer Season.....	1,759	302	11.6	2,072	1,649	232	11.8	1,893	1,704	267	11.7	1,983
Yearly.....	5,311	793	13.3	6,117	5,255	709	12.7	5,977	5,283	751	13.0	6,047

At Webberville the production was lower, averaging for the two years, 6,047 pounds per year, divided as follows: milk sold, 87.4%, used on the farm, 12.4%, and returned from the factory, .2%. During the winter season 4,064 pounds were produced and during the summer season, 1,983 pounds, making a total of 6,047 pounds for the year with an average test of 3.45% butter fat.

Throughout the three years studied, milk production at Howell was very uniform. The high point of production was during the months of January, February, March, April, May, and June (figure III), while the extreme low points were in August and September. At Webberville the production was less per cow than that at Howell, but ran practically parallel throughout the year.

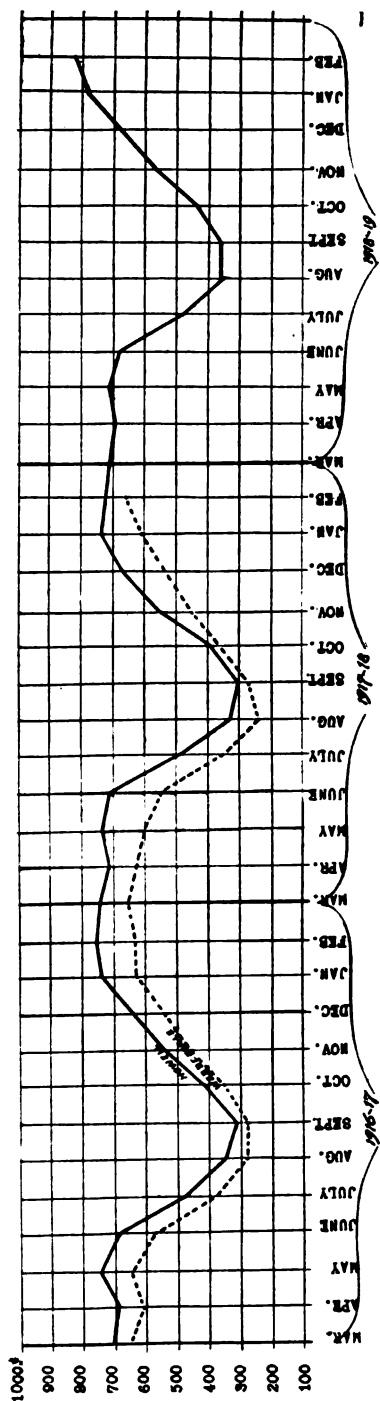


FIG. III. AVERAGE YIELD PER COW BY THE MONTH AT HOWELL AND WESSERVILLE.

CREDIT VALUES.

In order to determine the net cost of the milk sold, the value of all other products is subtracted from the gross cost of all milk produced. The value of the credits for each year studied, as well as for each month and season, is given in Tables XIII and XIV. Milk used on the farm, milk returned from the milk plant, the manure and the calves comprise the total credits.

The methods for determining the quantity of manure produced are given under the heading "Manure" on page 8. The average amount per year of manure credited to the dairy cow for the three years at Howell was 5.34 tons for the winter season and 2.195 tons for the summer season, making a total of 7.535 tons for the year. A value of \$1.50 per ton was allowed the first year and \$2.00 per ton thereafter, making a total of \$11.60 for the first year, \$15.08 for the second year and \$14.76 for the third year.

At Webberville this item amounted to 6.97 tons per cow, valued at \$10.46 for the first year, and 7.12 tons, valued at \$14.24 for the second year.

All milk used on the farm was valued at the market prices less the cost of hauling. Milk returned from the plant, due to poor condition, was charged in at its feeding value. In some cases where farmers did not have stock to which it could be fed, it was considered a total loss. As a whole this was a very small item and amounted to only fifteen cents per cow per year at Howell and seven cents per cow per year at Webberville.

A separate account was kept on feed bags sold during the last year's work at Howell. This amounted to twenty cents per cow. Previous to this year when feed bags were sold, their value was deducted from the cost of feed.

No value for calves is given. As previously stated, calves at birth were offset by sire costs.

The total value of the credits for the year amounted to \$34.21 for the first year, \$49.18 for the second year, and \$60.02 for the third year per cow at Howell and \$22.88 for the first year and \$30.20 for the last year at Webberville.

COST OF MILK SOLD.

No one factor tends to raise or lower the cost of production of milk as much as does the quantity of milk produced. The average production in the Howell field was 7,211 pounds per cow per year, ranging much higher than the average production throughout the state which is estimated at about 4,500 pounds.

TABLE XIV.—CREDITS FOR PRODUCTS OTHER THAN MILK SOLD PER COW PER MONTH AT WEBBERVILLE.

The three bottom lines of the table show the credits for products other than milk for winter and summer seasons and the yearly total.

Year.	1916-17.				1917-18.			
Month.	Manure value.	Milk used on farm, value.	Milk returned from plant, value.	Total value.	Manure value.	Milk used on farm value.	Milk returned from plant, value.	Total value.
March.....	\$1 10	\$0 98	\$0000	\$2 08	\$1 50	\$1 12	\$0 0026	\$2 62
April.....	1 10	91	0021	2 01	1 50	1 19	.....	2 69
May.....	83	68	0031	1 51	1 12	82	003	1 94
June.....	55	61	0156	1 18	75	67	0398	1 46
July.....	55	63	0105	1 19	75	71	0470	1 51
August.....	55	76	0024	1 31	75	67	0111	1 43
September.....	55	96	0018	1 51	75	1 37	.....	2 12
October.....	83	1 55	0045	2 38	1 12	1 87	.....	2 99
November.....	1 10	1 45	0012	2 55	1 50	1 78	.....	3 28
December.....	1 10	1 30	.....	2 40	1 50	1 83	.....	3 33
January.....	1 10	1 54	.....	2 64	1 50	2 08	.....	3 58
February.....	1 10	1 01	.....	2 11	1 50	1 75	.....	3 25
Winter Season.....	\$7 43	\$8 34	\$0 0059	\$15 77	\$10 12	\$11 18	\$0 004	\$21 30
Summer Season.....	3 03	4 04	0353	7 11	4 12	4 68	100	8 90
Yearly.....	10 46	12 38	0412	22 88	14 24	15 86	104	30 20

TABLE XV.—COMPARISON OF MONTHLY MILK COSTS AND RECEIPTS, PER COW AND PER HUNDRED WEIGHT AT HOWELL.

The three bottom lines of the table show the comparison of milk costs and receipts for winter and summer seasons, and the yearly total.

Month.	1916-17.						1917-18.					
	Receipts from milk sold.	Net cost of milk sold.	Profit per cow.	Loss per cow.	Price received per cwt. for milk at plant.	Cost of milk sold per cwt.	Profit per cwt.	Loss per cwt.	Receipts from milk sold.	Net cost of milk sold.	Profit per cow.	Loss per cow.
March.....	\$9 54	\$13 69	.....	\$4 15	\$1 526	\$2 190	.....	\$0 604	\$12 31	\$13 87	.....	\$1 56
April.....	8 60	13 16	.....	4 56	1 440	2 204	.....	764	10 88	12 99	.....	3 11
May.....	7 75	10 19	.....	2 44	1 236	1 625	.....	389	11 08	10 69	.....	39
June.....	6 28	7 85	.....	1 57	1 112	1 389	.....	277	10 63	8 65	.....	1 98
July.....	4 30	6 57	.....	2 18	1 224	1 830	.....	606	7 84	6 83	.....	1 01
August.....	3 65	6 34	.....	2 69	1 351	2 314	.....	983	5 24	5 82	.....	58
September.....	3 14	6 21	.....	3 77	1 437	3 184	.....	1 737	4 74	6 50	.....	1 76
October.....	5 25	7 65	.....	2 40	1 831	2 665	.....	834	8 28	10 30	.....	2 02
November.....	7 75	10 45	.....	2 70	2 004	2 700	.....	696	11 40	13 98	.....	2 58
December.....	10 21	12 02	.....	1 81	2 020	2 389	.....	360	16 85	17 66	.....	81
January.....	12 73	13 43	.....	70	2 061	2 205	.....	114	18 91	19 49	.....	58
February.....	11 03	12 35	.....	42	2 102	2 174	.....	72	16 70	17 77	.....	98
Winter season.....	67 33	86 07	.....	18 74	1 798	2 298	.....	500	96 18	108 01	.....	11 83
Summer season.....	23 89	34 54	.....	10 65	1 275	1 844	.....	569	37 77	36 54	.....	1 23
Yearly.....	91 22	120 61	.....	29 39	1 625	2 147	.....	524	133 95	144 55	.....	10 60

TABLE XVI.—COMPARISON OF MONTHLY MILK COSTS AND RECEIPTS, PER COW AND PER HUNDRED WEIGHT AT WEBBERVILLE.

The three bottom lines of the table show the comparison of milk costs and receipts for winter and summer seasons, and the yearly total.

Month.	1916-17.							
	Receipts from milk sold.	Net cost of milk sold.	Profit per cow.	Loss per cow.	Price received per cwt. for milk at plant.	Cost of milk sold per cwt.	Profit per cwt.	Loss per cwt.
March.....	\$9 90	\$12 43		\$2 53	\$1 625	\$2 041		\$0 416
April.....	7 93	10 39		2 46	1 472	1 928		456
May.....	7 63	7 57	\$0 06		1 251	1 241	\$0 01	
June.....	5 89	6 42		53	1 161	1 266		105
July.....	4 68	5 36		.66	1 381	1 581		200
August.....	4 01	4 55		54	1 690	1 919		229
September.....	3 80	4 72		92	1 698	2 107		409
October.....	5 59	5 98		39	1 989	2 142		153
November.....	7 43	8 08		65	1 971	2 143		172
December.....	9 43	10 38		93	1 969	2 167		198
January.....	12 08	11 71	37		2 120	2 054	066	
February.....	11 18	11 66		48	2 075	2 163		088
Winter Season.....	\$65 68	\$70 10		\$4 42	\$1 848	\$1 973		\$0 125
Summer Season.....	23 87	29 14		5 27	1 357	1 656		299
Yearly.....	89 55	99 24		9 69	1.686	1.868		182

1917-18.								
March.....	\$12 09	\$13 20		\$1 11	\$1 976	\$2 156		\$0 180
April.....	10 69	12 66		1 97	1 908	2 280		352
May.....	10 42	9 72	\$0 70		1 821	1 699	\$0 122	
June.....	9 23	8 26		97	1 842	1 648	194	
July.....	6 59	7 60		1 01	2 053	2 367		314
August.....	4 84	6 37		1 53	2 280	3 004		724
September.....	5 25	6 30		1 05	2 488	2 985		497
October.....	8 53	8 27	26		2 846	2 756	090	
November.....	10 97	12 70		1 73	2 919	3 377		458
December.....	14 91	16 80		1 89	3 067	3 456		389
January.....	17 34	18 36		1 02	3 140	3 326		186
February.....	16 83	17 73		90	3 051	3 212		161
Winter.....	\$93 12	\$101 88		\$8 76	\$2 582	\$2 825		\$0 243
Summer Season.....	34 57	36 09		1 52	2 096	2 188		.092
Yearly.....	127 69	137 97		10 28	2 430	2 626		196

Tables XV and XVI give the cost of production and the amount received per cow and per hundred weight of milk for each month as well as for the winter and summer seasons and for each year of the entire period covered. There has been a steady increase in costs as well as in prices received during this period and the data given should be of great interest to the reader. It shows that in the Howell territory in March, 1916, it cost the farmer \$2.19 to produce one hundred pounds of milk for which he received \$1.526, thus making a net loss of \$0.664, while in February, 1919, the cost per hundred weight has risen to \$3.279 and the

price received was \$3.337. The cost increased 49% during the period given in the table, and out of the 36 months studied, only seven were profitable.

Figure IV shows the general trend of costs and prices received per hundred weight of milk during the period this study covers. The greatest spread between prices received and cost of production came during the September months when milk production was at its lowest point, thus making the cost per unit very high.

The average yearly loss per cow was \$29.39 the first year, \$10.60 the second year, and \$20.54 the third year.

Out of the twenty-five farms studied in this district only one made a profit the first year, nine the second, and six the third.

To have enabled all farmers to recover cost of production when selling milk at the prices named, a yearly average production of 8,088 pounds per cow would have been required. Furthermore, it would have been necessary to accomplish this larger production without any additional expenditure for extra feed.

In March, 1916, it cost the Webberville farmers \$2.041 per hundred-weight, and in February, 1918, \$3.212 or an increase of 57.4% in two years.

The average yearly loss per cow was \$9.69 the first year and \$10.28 the second year. Out of the twenty-five farms studied four made a profit the first year and nine the second year.

As a whole, milk was produced considerably cheaper at Webberville (figure V) than at Howell, which may be attributed to the smaller investment, the larger amount of cheap grain fed, and the fewer hours spent in caring for the dairy herd. However, the general trend of prices and costs was similar to that of Howell territory. (Figure IV.)

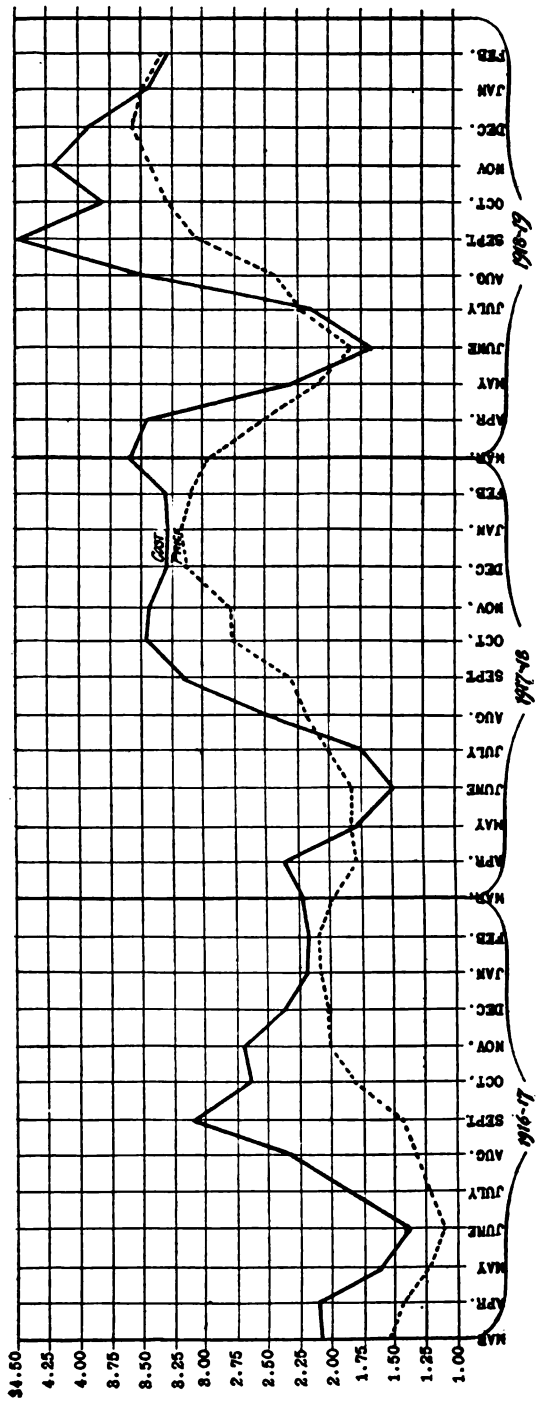


FIG. IV. AVERAGE COST OF PRODUCTION AND PRICE RECEIVED FOR MILK AT HOWELL.

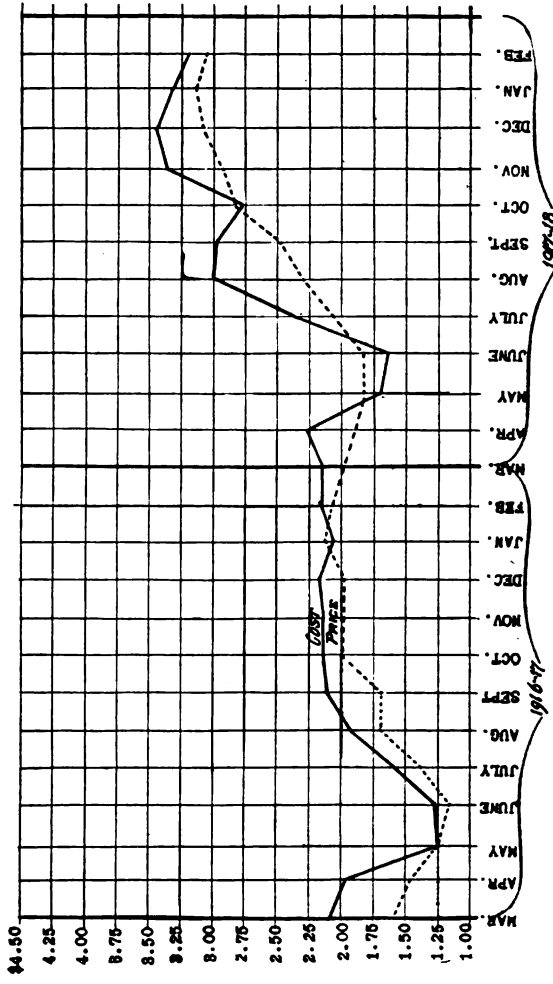


FIG. V., AVERAGE COST OF PRODUCTION AND PRICE RECEIVED FOR MILK AT WEBSERVILLE.



FIG. VI.. AVERAGE EXPENDITURES AND RECEIPTS PER COW FOR EACH SEASON AND THE YEAR.

SUMMARY.

1. In order to keep a detailed record of the dairy costs it was necessary to separate the dairy business from the other farm operations. In this way the dairy is dependent entirely on its own resources.

2. As cost of milk production was the main factor under consideration in this Bulletin, the method used was based on the dairy cow as a unit.

3. The fields studied were located in the vicinity of Howell, Livingston county, and Webberville, Ingham county. Twenty-five farms were studied in each territory for a period of three years at Howell and two years at Webberville.

4. Of the total cost, feed represents 48.9%, labor 24.1%, and other costs 27.0% at Howell, and at Webberville, feed represents 46.4%, labor 25.2% and other costs 28.4%.

5. The average cost of keeping a cow was \$154.82 in 1916-17 and \$241.34 in 1918-19 at Howell, and at Webberville the cost amounted to \$122.12 the first year and \$168.17 the second year.

6. The total receipts per cow at Howell from all sources amounted to \$125.43 in 1916-17 and \$220.80 in 1918-19. At Webberville the total receipts amounted to \$112.43 in 1916-17 and \$157.89 in 1917-18.

7. The average annual production per cow was 7,211 pounds at Howell and 6,047 pounds at Webberville.

8. The average selling price per hundred weight for the Howell territory was \$1.625 the first year, \$2.405 the second year, and \$2.881 the third year. At Webberville the selling price was \$1.686 the first year and \$2.430 the second year.

9. It cost to produce every hundred pounds of milk sold at Howell \$2.147 in 1916-17, \$2.596 in 1917-18, and \$3.249 in 1918-19, and at Webberville in 1916-17 it cost \$1.868, and in 1917-18 the cost was \$2.626.

After reading the foregoing pages, the reader may wonder how any dairy farmer can produce and sell milk at the prevailing prices and still continue in the business.

In answering the query it must be conceded that many do quit the business or turn to other types of farming. In general it may be said that those farmers who continue in the business of producing milk for the city trade do so in conformity to some one or more of the following reasons:

First: In order to make their business balance they must credit to themselves for time spent with the dairy a much lower hourly wage than the hired laborer would or could accept. The average wage for all time spent in dairy operations on the farms reported in this Bulletin was a trifle less than 12½ cents per hour. The character of the work to be performed in producing milk is such that intelligent and willing help is essential. Such labor must be well paid, or if the work is performed by the farmer or members of his family, they must feel that the financial returns of the enterprise are such as to properly recompense them for their painstaking effort. Already large numbers of

farmers' sons are flocking to the cities to accept employment in the various factories and plants. Unless rural employers can in some measure successfully compete for the services of these men milk production will certainly be decreased.

Second: A second reason why the farmer may accept a very low hourly wage and still continue to carry on his business is that he works more hours per day than the standard laborer. Dairy cows could not be properly milked by maintaining a single crew of men on an eight hour schedule. The eight hour day can never come on the dairy farm. The dairyman's actual working time comes much nearer to 12 hours out of the 24 than it does to 10 hours.

In justice to the dairy business it must be said that fully one-sixth of the time spent in the dairy would be classed as over-time by the city laborer. By this we mean that it is performed on holidays or Sundays or very early in the morning or very late at night.

Third: In presenting the third reason it must be borne in mind that dairy farming and milk production is one of the most expensive types of farming; that is, it demands a much larger investment than grain or crop farming. A person without considerable capital may not undertake dairy production except as a tenant. Necessary land, buildings, cattle and special equipment compel the dairy farmer to have a comparatively large capital before he can enter upon the business of milk production.

If, as is often the case, the dairy farmer accepts less than the legal rate of interest on his investment or as is sometimes the case he receives no annual interest on his investments in land, cattle, buildings, and equipment, he may still continue the business.

It is self-evident, however, that dairy production must return a reasonable annual interest on the capital invested if it is to be a permanent agricultural enterprise.

Fourth: Many farmers continue to stay in the business by "mining" their farms. Cropping from year to year without adding an equal amount of fertilizer means that the operator is selling his farm by degrees and in time its actual value for dairy production is greatly lowered. In this same manner farmers stay in the business by wearing out their buildings and equipment and never replacing them.

Fifth: It must be conceded that there is some additional income besides the regular receipts from the dairy. While this is not large on the specialized dairy farm, it sometimes helps the farmer to break even or at least saves him from excessive loss.

THE DATA PRESENTED AS A FORMULA.

The data in this bulletin are more or less a record or history of the dairy business for the past three years and do not represent present conditions, due to the change which has taken place in prices. For this reason the following formula has been designed for the purpose of making this data applicable to all conditions, and by applying current prices to the amounts of feed and labor given, the portion of the cost of milk represented by these factors should be approximately correct. While this formula only gives the feed and labor items, the other items which cannot be represented in terms of pounds or days are consequently represented by a corrective factor, which means a factor stated in percentages of feed and labor. For example, the corrective factor for the winter feeding period is .2183 or 21.83% of the feed and labor costs. This corrective factor has been adjusted so as to take care of the receipts such as manure, etc., and the total gives the net cost of producing 100 pounds of milk. If the feed and labor costs, including the hauling of milk amount to \$3.25, then \$3.25 multiplied by .2183 equals \$0.71. \$3.25 plus \$0.71 equals \$3.96, the net cost of 100 pounds of milk. The same application holds true for all the seasons and the year.

A FEED AND LABOR FORMULA.

The following formula give the average feed and labor items and their amounts, entering into the production of 100 pounds of milk at Howell and Webberville for each season and the year. The other costs (overhead) are determined by multiplying the value of these items by the corrective factors given, thus giving the approximate net cost of producing milk.

Seasons.	Winter Period.	Summer Period.	Yearly.
Home grown grains.....	12.1 lbs.	4.0 lbs.	9.4 lbs.
Commercial feeds.....	16.5 lbs.	6.8 lbs.	13.3 lbs.
Hay.....	49.2 lbs.	10.5 lbs.	36.3 lbs.
Other dry roughage.....	21.4 lbs.	2.5 lbs.	15.1 lbs.
Silage.....	147.2 lbs.	21.1 lbs.	105.1 lbs.
Soiling crops and other succulent feeds.....	3.5 lbs.	9.6 lbs.	5.5 lbs.
Pasture days.....	.....	6.9 days.	2.4 days.
Bedding.....	17.9 lbs.	2.9 lbs.	12.9 lbs.
Labor performed by owner or operator.....	1.01 hrs.	.96 hrs.	.99 hrs.
Labor performed by hired help.....	.99 hrs.	1.00 hrs.	1.00 hrs.
Horse labor.....	.11 hrs.	.05 hrs.	.09 hrs.
Hauling milk, cost per cwt.....	.....	.....	.....
Corrective factor.....	.2183	.4499	.2750

ACKNOWLEDGMENTS.

Due credit should be given the following men who devoted their time to the collection of the statistics presented in this Bulletin: Mr. A. C. Lytle who collected all the Webberville data, and to Messrs. Stanley J. Brownell, H. A. Andrews, and Ray Baker who collected the Howell data.

The authors also wish to express their appreciation to the farmers who co-operated with the field accountants by allowing records to be secured on their farms, and for their assistance in furnishing information which made it possible to secure the statistics given in the following pages.

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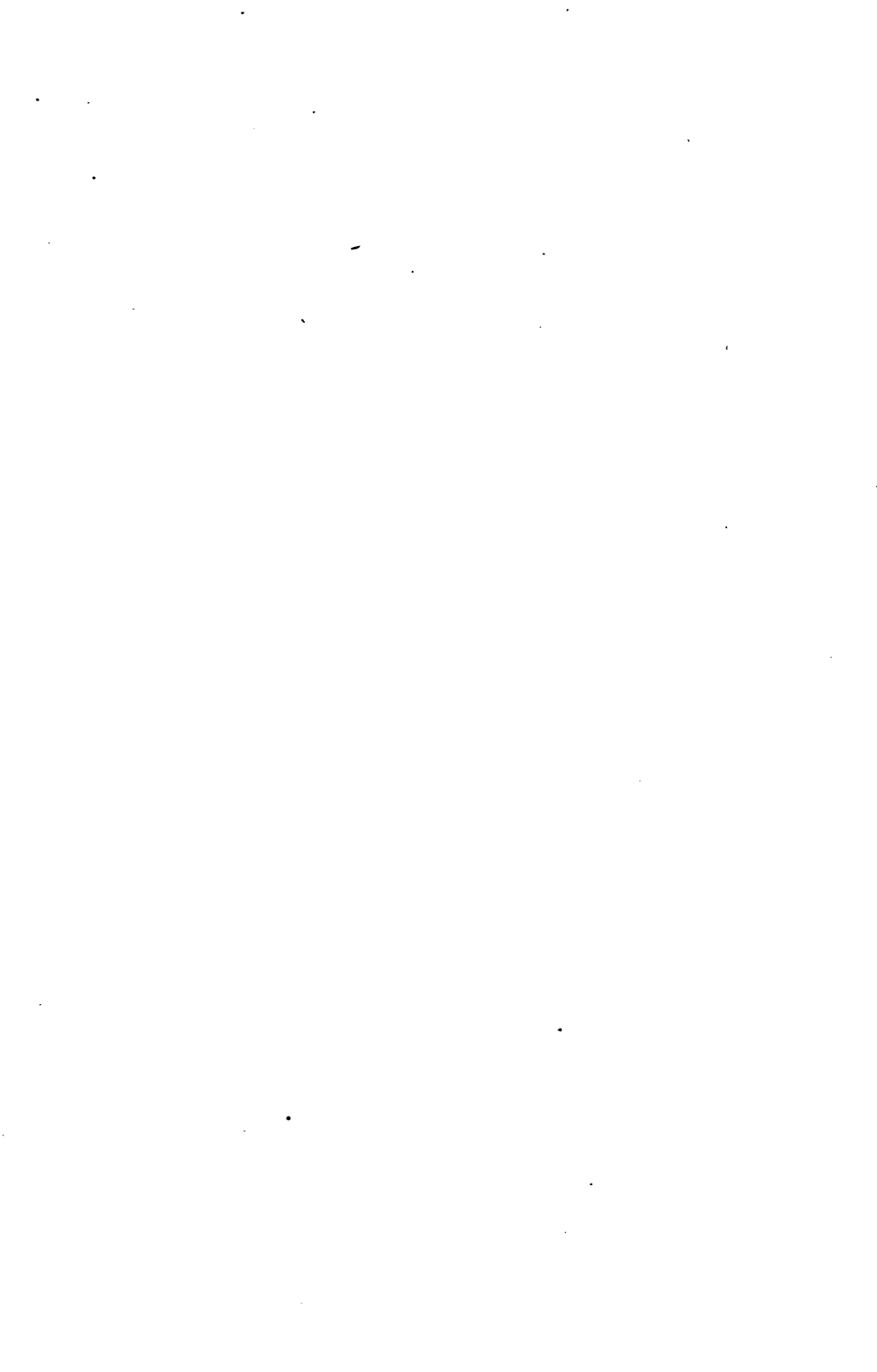
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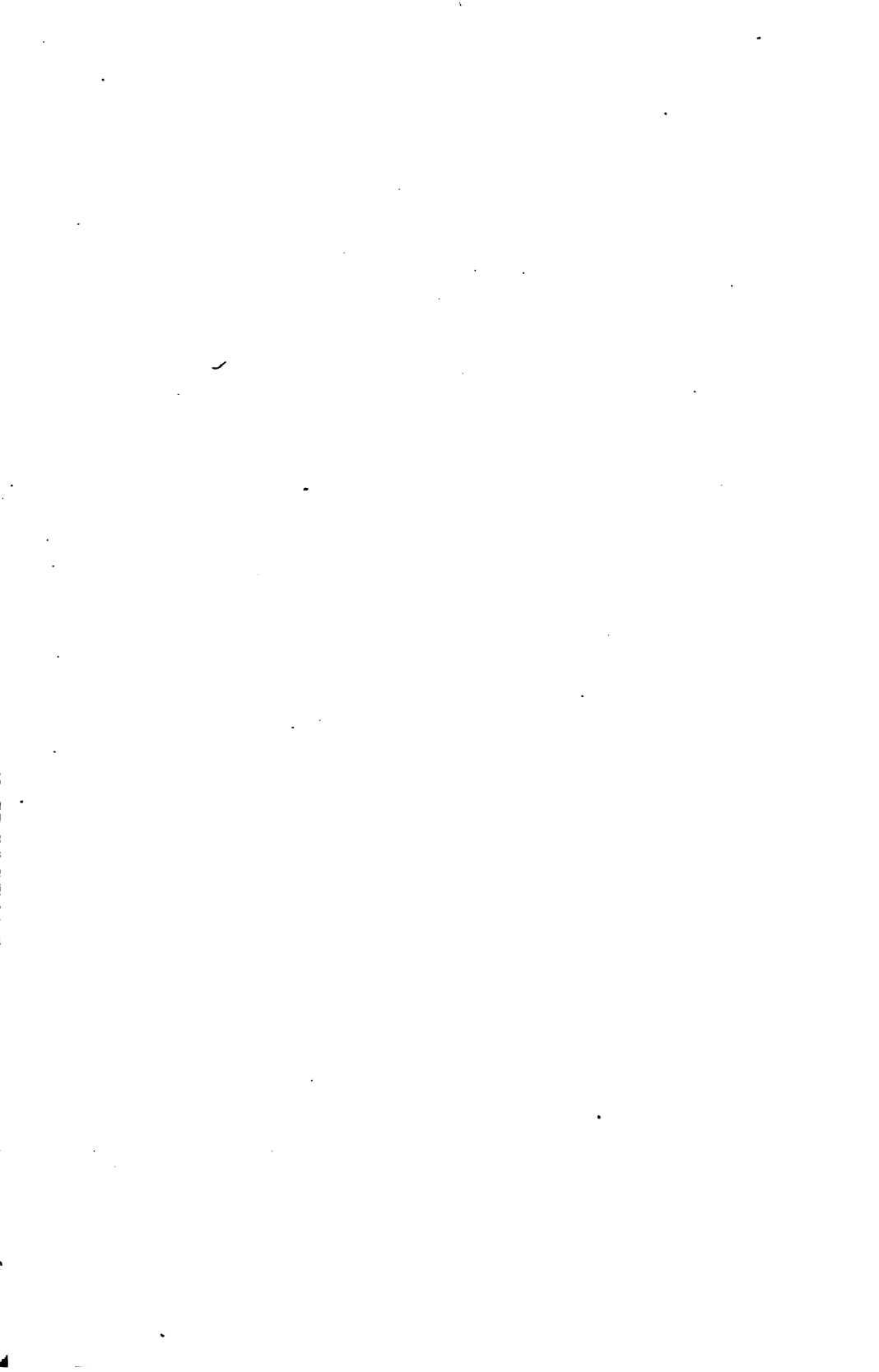
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Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
 Graying, Crawford County, 80 acres deeded.
 South Haven, Van Buren County, 10 acres rented; 5 acres deeded.
 Graham Station, Kent county, 50 acres donated.





MICHIGAN AGRICULTURAL COLLEGE

EXPERIMENT STATION



CHEMICAL SECTION

FERTILIZER ANALYSES

BY

ANDREW J. PATTEN, C. F. BARNUM, E. F. BERGER, A. L. LEWIS,
M. L. GRETTEMBERGER AND P. O'MEARA

EAST LANSING, MICHIGAN
1919



The Station

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FERTILIZER ANALYSES

The inspection and analysis of commercial fertilizer, sold, offered or exposed for sale in Michigan is made under authority of an act of the Legislature approved March 10, 1885, and as amended during the session of 1913. The full text of the law will be sent to any person upon request.

LICENSED BRANDS.

During the year 1919, 40 manufacturers and fertilizer companies licensed 374 brands for sale in the State. This is the largest number of brands ever licensed in one year. Attention is called to the fact that the fertilizer law covers only those materials which are sold, offered or exposed for sale within the State, the retail price of which is \$10.00 or more per ton. Manufacturers residing outside the State may ship direct to the consumer without paying the license fee but the party making the purchase receives no protection under the law. If the sale of fertilizer to be shipped direct to the consumer is made by an agent or representative of the manufacturer while in the State, the act is considered as one of actually offering the material itself for sale, and the fertilizer then becomes subject to the requirements of the law just as surely as though the fertilizer were actually brought into the State and then sold. Consequently, an agent of a fertilizer company is technically violating the law when he solicits or accepts orders for any unlicensed fertilizer, while in the State.

COLLECTION OF SAMPLES.

The collection of samples was made during the spring and fall shipping seasons by inspectors appointed by the State Board of Agriculture.

All sections of the State in which fertilizers are used to any extent were visited and 1,083 samples were secured from stocks being offered for sale by dealers. For this purpose a specially constructed tube is used which permits of securing a core from the entire length of the bag. An official sample consists of the cores taken from not less than five separate sacks of the same brand. The five or more separate cores are mixed together, placed in a stout sack, tied, sealed and forwarded to the laboratory for analysis.

Much of the fertilizer used in the State is taken directly from the cars by the consumers and it is never possible for the inspectors to secure samples of all the brands registered. It sometimes happens that a manufacturer fails, for some reason or other, to sell any of a particular brand or the sales may be very light and in the latter case it is only by chance that a sample is found.

During the past year, 23 registered brands were not shipped into the State. It was formerly the custom, whenever we failed to find a brand

on the market, to analyze the sample forwarded by the manufacturer, as required by law, at the time of applying for the license. It has long been known that these samples were generally if not always made up in the laboratories of the companies and were not, therefore, representative of the product as put on the market. For this and other reasons we have discontinued this practice and in this bulletin the brands not represented by samples are listed in their proper places but are not given a laboratory number and only the guaranteed analysis is shown.

In many cases several samples of the same brand were drawn and analyzed. This, of course, greatly increases the work in the laboratory but it is the only way by which we can ascertain if the brands are running uniform. If only one sample were analyzed, or if several samples were taken and composited before being analyzed, variations in the composition would not be detected.

ANALYSIS OF MISCELLANEOUS SAMPLES.

On account of the large amount of work involved in the inspection of fertilizers our laboratory force is kept busy constantly with samples collected by the inspectors. It is therefore impossible for us to give attention to miscellaneous fertilizer samples sent to us. Furthermore, unless the samples are taken in the manner previously described they will not truly represent the lot or shipment of which they were a part and the analysis of such a sample would be an injustice either to the manufacturer or purchaser.

In all cases where doubt arises as to the merits of any particular shipment, we suggest that this office be notified and an inspector will be sent to make an investigation and draw an official sample.

RESULTS OF INSPECTION.

A study of the tables of analyses show that, of the 1,083 samples analyzed, representing 342 brands, 267 (24.7%) are below guarantee* in one or more constituent. Seventy-seven (7.1%) are below guarantee in nitrogen, 9 (0.8%) are below guarantee in total phosphoric acid, 98 (9.0%) are below in available phosphoric acid and 142 (13.1%) in potash.

In making a careful study of the tables of analyses it will be noted that the majority of deficiencies are confined to a comparatively few companies. For example one company contributes 26 per cent of all the brands found below guarantee, three companies contribute 49 per cent of the deficient brands and eight companies contribute 75 per cent of the brands showing deficiencies. In other words, 20 per cent of the manufacturers are responsible for three-fourths of all the deficiencies.

It is not claimed that these deficiencies are the result of wilful attempts to defraud the purchasers, in fact, we believe this is not the case, but the fact remains nevertheless, that a few companies are responsible for the majority of the deficiencies and whether these result from premeditated plans or from poor factory management the results are the same and the purchaser must suffer the loss.

*A shortage of more than 0.10 per cent of nitrogen or more than 0.20 per cent available phosphoric acid or more than 0.10 per cent potash is considered below guarantee.

In a few instances the deficiencies noted are plainly due to an error on the part of workmen in the factory, such as filling bags from the wrong pile. These, of course, are excusable and should be overlooked. But where every sample of some particular brand is found to be below guarantee, not only in one ingredient but in two and sometimes all three ingredients the deficiencies cannot be charged up to mistakes of workmen. Such a condition can only be explained on the grounds of poor factory management or to a desire on the part of the company to mix so close to the formula as to avoid overrun as much as possible.

A summary of the inspection is given in the following table.

Manufacturer.	Number of brands licensed.	Number of samples analyzed.	Number below guarantee in one or more ingredient.	Percentage of total number of deficiencies.
American Agricultural Chemical Co.	88	285	10	3.7
Armour Fertilizer Works.	28	84	20	10.9
The Barrett Co.	1	2	1	0.4
R. Bander Co.	1	1	1	0.4
N. Burleson.	1	2	1	0.4
E. Burton Fertilizer Works.	1	1	0	0.0
Calumet Fertilizer Co.	19	56	16	6.0
Chicago Feed & Fertilizer Co.	1	1	0	0.0
Cincinnati Plant Food Co.	1	1	0	0.0
Columbia Guano Co.	0	11	5	1.9
Darling & Co.	11	45	12	4.5
Federal Chemical Co.	30	65	19	7.1
Fertile Chemical Co.	2	2	0	0.0
Gleason Clearing House Association.	8	10	2	0.8
Holland-St. Louis Sugar Co.	2	2	0	0.0
Independent Packers Fertilizer Co.	10	36	11	4.1
International Agricultural Corporation.	13	48	3	1.1
Jarecki Chemical Co.	12	28	12	4.5
Morris & Co.	12	52	11	4.1
National Plant Food Co.	8	1	1	0.4
Natural Guano Co.	1	2	0	0.0
Nitrate Agencies Co.	1	1	0	0.0
Pacific Manure & Fertilizer Co.	1	0	0	0.0
Packers Fertilizer Co.	1	3	1	0.4
Parke Davis & Co.	12	34	9	3.4
Pulverized Manure Co.	1	0	0	0.0
Queen City Fertilizer Co.	3	4	2	0.8
F. S. Royster Guano Co.	1	1	1	0.4
Smith Agricultural Chemical Co.	21	113	70	26.2
Sodus Humus Co.	7	22	2	0.8
Solvay Process Co.	1	1	1	0.4
L. Speidel.	1	1	0	0.0
J. L. & H. Stadler Rendering & Fertilizer Co.	1	2	1	0.4
Nicholas Swartz.	11	22	0	0.0
Swift & Co.	1	1	0	0.0
Virginia Carolina Chemical Co.	24	86	32	12.0
Wayne Soap Co.	19	42	7	2.6
Thos. W. Wolcott.	2	1	1	0.4
Wuichet Fertilizer Co.	1	1	1	0.4
	6	13	5	1.9
	374	1,083	267	100.4

FERTILIZER STATISTICS.

The following table shows the amount of fertilizer used in the State for three years 1913, 1917 and 1919, as determined from the sales reported by the manufacturers. It will be noted that in the seven years, from 1913 to 1919 inclusive, there was an increase of 107 per cent. The greatest increase took place in 1917 and prior thereto, as in the past two years the increase has been a little less than 13 per cent.

Year.	Spring tonnage.	Fall tonnage.	Total tonnage.
1913.....	28,166	21,642	49,808
1917.....	46,369	45,086	91,455
1919.....	52,582	50,682	103,264

HIGH GRADE FERTILIZERS MOST ECONOMICAL.

Since the outbreak of the great war there has been a very great change in the character of the fertilizers offered for sale in the State. Previous to that time brands containing 2 per cent ammonia, 8 per cent available phosphoric acid and 5 to 10 per cent potash were very common. However with the beginning of hostilities importation of potash salts ceased and in order to conserve the supply then on hand the percentage supplied in fertilizers was reduced to 3 per cent as the maximum and in many brands it was eliminated entirely. During this time the cost of the potash advanced from \$1.00 per unit to \$8.00 or more as the upper limit. This began to stimulate local production of potash and the price has gradually receded to \$3.00 per unit. At the same time the demand for nitrate of soda for the manufacture of war munitions and sulfate of ammonia for refrigeration purposes caused the price of ammoniates to advance to a point more than double the former price.

This scarcity of ammoniates and potash and the desire of the manufacturers to meet the popular demand for lower-priced fertilizers has been responsible for the appearance of several brands containing only one-half per cent of ammonia and potash respectively with varying amounts of phosphoric acid.

All this time the cost of manufacturing fertilizers has been steadily increasing owing to increased wages, freight rates, cost of bags, etc. Consequently, by cheapening the quality of the fertilizers with a corresponding lowering of the price per ton, the actual cost of the plant-food has been increased.

For example, suppose a farmer were planning to use 4 tons of a $\frac{1}{2}$ -8- $\frac{1}{2}$ fertilizer on oats in the spring. The manufacturer's price of this brand is \$30.25 to which should be added about \$2.50 per ton as the dealers profit. The total cost of the 4 tons would therefore be \$131.00. The same amount of plant-food could be obtained in one ton of a 2-12-2 fertilizer and one ton of 20% acid phosphate which would cost \$47.00 and

\$31.25 respectively plus \$2.50 per ton as the dealers profit, or a total of \$83.25. The saving, therefore, in using the two tons of high grade fertilizers would be \$47.75. In addition there would be the saving in the cost of handling only two tons of fertilizer instead of 4 tons. This alone, would pay for the cost of mixing the 2-12-2 fertilizer with the acid phosphate.

This saving is effected principally by a reduction in the overhead expense for it costs just as much to mix one ton of the $\frac{1}{2}$ -8- $\frac{1}{2}$ fertilizer as one ton of the 2-12-2 fertilizer. A tremendous saving could, therefore, be effected if the farmers would purchase their plant-food in the higher analysis fertilizers. It has already been stated that 103,264 tons of fertilizer were used in Michigan during 1919. This amount could, unquestionably, be reduced by 25,000 tons without reducing the amount of actual plant-food if the farmers would buy only high-grade fertilizers. This would mean a saving of more than \$450,000. During the past two years there has been considerable agitation from various sources, toward the use of higher grade fertilizers, but very little will be accomplished along this line until the farmers themselves demand such fertilizers.

In the following table is shown a list of fertilizer formulas varying from very low to high-grade with the manufacturers price and the percentage of this required to cover the overhead expense.

Formula.	Wholesale price.	Per cent required for overhead.
1- 8-1.....	\$30 25	62
1-10-0.....	33 50	56
1- 8-1.....	34 75	54
0-12-2.....	35 25	53
1- 9-1.....	35 75	52
1-10-1.....	36 50	51
1- 8-2.....	37 75	50
2-10-0.....	39 50	47
2- 8-1.....	40 50	46
2-12-0.....	41 25	45
2- 8-2.....	43 50	43
3- 8-1.....	46 50	40
2-12-2.....	47 00	40
2-12-3.....	50 00	38
2- 8-5.....	52 25	36

It will be noted that with the low grade ($\frac{1}{2}$ -8- $\frac{1}{2}$) formula, the overhead expense constitutes 62 per cent of the wholesale price while with the high-grade (2-8-5) the overhead constitutes only 36 per cent of the purchase price. As the actual value of the fertilizer increases the lower becomes the overhead percentage. In other words, with the low grade fertilizers the overhead or manufacturing cost is more than the plant-food itself is worth while with the higher grades the value of the plant-food is considerably more than the overhead expense. In purchasing fertilizers, therefore, it should be the aim of the buyer to secure just as much of the desired forms of plant-food per ton of fertilizer as possible and reduce the per acre application to comply with previous practice. For example, it would be much more economical to use 100 lbs. of 20% acid phosphate or 125 lbs. of 16% acid phosphate per acre than 200 lbs. of 10% acid phosphate, as the following figures will show:

200 lbs. 10% Acid Phosphate costs	\$4.75
100 lbs. 20% Acid Phosphate costs	3.12
<hr/>	
Saving per acre	\$1.63
200 lbs. 10% Acid Phosphate costs	\$4.75
125 lbs. 16% Acid Phosphate costs	3.54
<hr/>	
Saving per acre	\$1.21

Exactly the same amount of available phosphoric acid is contained in 100 lbs. of 20% acid phosphate or 125 lbs. of 16% acid phosphate as in 200 lbs. of 10% acid phosphate and the saving in one case is \$1.63 and in the other \$1.21. Still some farmers continue to use 10% acid phosphate because it is cheaper per ton.

In these times when labor is scarce and very expensive the farmers should endeavor to produce the maximum amount per acre. The judicious use of fertilizers will help toward this end and careful buying will have much to do with the amount of profit derived from the use of fertilizers.

EXPLANATION OF TABLES.

The results of analysis shown in the following tables are arranged by manufacturers, in alphabetical order. Those found below guarantee are printed in bold-face type.

Nitrogen. It will be noted that the results under this heading are divided into four columns. The column headed "As Soluble" shows the amount of nitrogen that is soluble in water. This would include all nitrogen present as nitrate of soda, sulfate of ammonia, cyanimid, etc. This portion of the nitrogen is considered to be immediately available.

The second and third columns together represent the nitrogen that is insoluble in water. This insoluble nitrogen is separated into "active" and "inactive" nitrogen depending upon its reaction with an alkaline solution of potassium permanganate. When the amount shown "as active insoluble organic" is greater than that shown "as inactive insoluble organic" the whole insoluble nitrogen is considered to be of good quality. In other words, it has been derived from some high-grade material possessing a high rate of availability or the material used has been treated in such manner as to render it largely available. If, on the other hand, the amount of nitrogen shown in the "inactive" column is greater than that shown in the "active" column then the *insoluble nitrogen* is considered to be low grade with a low rate of availability. When the insoluble nitrogen constitutes a small percentage of the total, its rate of availability would, of course, be of small consequence. But, where the "insoluble nitrogen" constitutes a considerable portion of the total, as is very often the case, then, its rate of availability is an important factor.

Since nitrogen is, by far, the most expensive plant-food ingredient in fertilizers, more attention should be given to the results printed in the following pages under this heading and when purchasing nitrogenous fertilizers preference should be given those companies that show the

insoluble nitrogen in their mixtures to be derived from high-grade materials.

The fourth column shows the total amount of nitrogen in the sample. It is equal to the sum of the first three columns.

Phosphoric Acid. Three divisions are included under this heading, designated as "total," "insoluble" and "available." The "total" phosphoric acid includes all of this ingredient in the sample. The "insoluble" phosphoric acid represents that portion that is unavailable and the "available" phosphoric acid, is, as the name implies, readily available. The available phosphoric acid represents the difference between the total and insoluble phosphoric acid.

Potash. The results shown under this heading are those soluble in water as required by the law. Water-soluble potash is, of course, readily available.

FERTILIZER ANALYSES.

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A 183° M. & I. 3% Potash Fertilizer.	Union City.....	0.63	0.12	0.25	1.00	10.40	0.90	9.50	3.11
A 184° M. & I. 3% Potash Fertilizer.	Grand Rapids.....	0.28	0.25	0.44	0.97	10.25	1.10	9.15	3.24
A 3154 M. & I. 3% Potash Fertilizer.	Covert.....	0.39	0.18	0.30	0.87	10.35	1.26	9.09	2.95
A 3346 M. & I. 3% Potash Fertilizer.	Mason.....	0.40	0.19	0.36	0.85	10.43	1.22	9.21	3.07
A 3490° M. & I. 3% Potash Fertilizer.	Highland.....	0.55	0.14	0.32	1.01	10.65	1.02	9.63	2.90
	Average.....	0.46	0.18	0.33	0.97	10.43	1.10	9.33	3.02
A 2724 New York State Special 1916.	Banters.....	{ G.†			0.82			8.00	1.00
A 2778 New York State Special 1916.	Adrian.....	{ F.†			0.85	10.90	1.56	9.34	1.31
A 2786 New York State Special 1916.	Erle.....	0.35	0.28	0.38	1.01	11.06	1.04	10.01	1.23
A 2842 New York State Special 1916.	Plymouth.....	0.41	0.19	0.34	0.94	10.70	0.80	9.90	1.18
A 2843 New York State Special 1916.	Flat Rock.....	0.31	0.21	0.39	0.81	10.85	1.04	9.81	1.16
A 3043° New York State Special 1916.	Adrian.....	0.46	0.20	0.32	0.98	10.70	1.32	9.38	1.18
	Average.....	0.71	0.13	0.16	1.00	10.50	1.06	9.44	1.10
A 3004 Nitrate of Soda.		0.45	0.20	0.31	0.96	10.78	1.14	9.64	1.19
A 3213 Nitrate of Soda.	Peauville.....	{ G.†			15.00				
	Detroit.....	{ F.†			15.85				
	Average.....				15.77				
A 2668 1 & 10 Compound.	Romeo.....	{ G.†			0.82	12.90		10.00	
A 2734 1 & 10 Compound.	Ossio.....	{ F.†	0.23	0.23	1.05	13.00	1.92	10.98	
A 2840 1 & 10 Compound.	Plymouth.....	0.56	0.19	0.29	1.04	13.00	1.80	11.20	
A 2860 1 & 10 Compound.	Beech.....	0.49	0.22	0.27	0.98	13.30	1.46	11.84	
A 2863 1 & 10 Compound.	Novi.....	0.42	0.25	0.33	1.00	13.70	1.60	12.10	
A 2885 1 & 10 Compound.	Willow.....	0.47	0.14	0.30	0.91	13.25	1.86	11.39	
A 2903 1 & 10 Compound.	Flat Rock.....	0.50	0.21	0.27	0.98	13.80	1.76	12.04	
A 3010 1 & 10 Compound.	Hudsonville.....	0.56	0.23	0.29	1.08	13.65	1.60	12.05	
	Average.....	0.59	0.22	0.24	1.05	13.40	1.92	11.48	
Bradley Brands.									
A 3380 Acid Phosphate.	Saover.....	0.52	0.21	0.28	1.01	13.38	1.74	11.64	
A 2817 16% Acid Phosphate.	Traverse City.....	{ G.†				12.70	1.22	10.00	
A 2928 16% Acid Phosphate.	Milan.....	{ F.†				18.85	0.86	17.98	
A 3066 16% Acid Phosphate.	Buchanan.....					18.25	0.76	17.48	
	Average.....					18.53	0.64	17.91	
A 3151 All Crops Fertilizer.	Lacota.....	{ G.†			0.82	18.55	0.75	17.80	
		{ F.†	0.18	0.26	0.95	12.90	1.32	10.58	1.00
A 2819 B. D. Sea Fowl Guano 1918.	Traverse City.....	{ G.†			1.65			8.00	
A 3065 B. D. Sea Fowl Guano 1918.	Buchanan.....	{ F.†	0.47	0.36	1.66	10.50	1.92	8.88	
A 3152 B. D. Sea Fowl Guano 1918.	Lacota.....	1.02	0.45	0.29	1.76	10.35	1.72	8.63	
	Average.....	0.95	0.49	0.34	1.73	10.65	1.10	9.15	

†Abbreviations for Guaranteed and Found
°Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.
American Agricultural Chemical Co.—Continued.									
Bradley Brands.—Concluded.									
A 2911	B. D. Sea Fowl Guano with Potash.....	Wyandotte..... { G.† F.†	0.97	0.42	0.28	1.65 1.67	..... 0.96	8.00 10.34	1.00 1.28
A 2760	Dissolved Bone Phosphate with Potash 1916.....	Clayton..... { G.† F.†	0.22	0.23	0.35	0.88	.....	8.00	1.00
A 3238	Dissolved Bone Phosphate with Potash 1916.....	Lulu.....	0.48	0.19	0.26	0.93	1.10	10.10	1.16
A 3319	Dissolved Bone Phosphate with Potash 1916.....	Birch Run.....	0.49	0.19	0.30	0.98	1.56	8.94	0.92
A 3567*	Dissolved Bone Phosphate with Potash 1916.....	St. Johns.....	0.48	0.23	0.16	0.87	1.80	8.80	1.13
	Average.....		0.42	0.21	0.27	0.90	1.02	9.23	1.22
						0.90	1.37	9.27	1.12
A 2759	Niagara Phosphate.....	Clayton..... { G.† F.†	0.48	0.22	0.24	0.88	.....	7.00	1.00
A 3228	Niagara Phosphate.....	Adrian.....	0.24	0.28	0.41	0.94	1.06	8.19	1.18
A 3353	Niagara Phosphate.....	Devon.....	0.49	0.26	0.29	1.03	0.86	9.09	1.00
	Average.....		0.40	0.26	0.31	1.04	1.08	8.17	1.09
A 2929	Soluble Dissolved Bone Phosphate.....	Milan..... { G.† F.†	.....	.....	.....	0.97	1.00	8.48	1.09
A 3011	Soluble Dissolved Bone Phosphate.....	Hudsonville.....	.....	.....	.....	.....	.....	14.00	.....
A 3373	Soluble Dissolved Bone Phosphate.....	Uby.....	.....	.....	.....	.....	1.24	16.36	.....
	Average.....		.....	.....	.....	.....	0.58	16.07	.....
			.....	.....	.....	.....	0.74	15.16	.....
A 3352	Special Potash Fertilizer 1916.....	Devon..... { G.† F.†	0.56	0.17	0.29	0.88	0.85	15.87	.....
A 3376	Special Potash Fertilizer 1916.....	Cass City.....	0.53	0.18	0.26	1.02	1.40	8.00	1.00
A 3406	Special Potash Fertilizer 1916.....	Ithaca.....	0.59	0.15	0.27	1.01	0.60	8.15	1.17
	Average.....		0.56	0.17	0.27	1.00	0.58	9.40	1.14
			.....	.....	.....	.....	0.58	10.02	1.16
A 3295	10% Acid Phosphate.....	Yale..... { G.† F.†	.....	.....	.....	1.00	0.86	9.19	1.16
	Crocker's Brands.		.....	.....	.....	.....	.....	10.00	.....
			.....	.....	.....	.....	0.74	11.51	.....
A 3122	Ammoniated Wheat & Corn Phosphate 1916.....	Muir..... { G.† F.†	0.77	0.45	0.39	1.65 1.61 1.70	8.00 9.39	1.00 1.46

FERTILIZER ANALYSES.

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A 3123 A 3434	Ammoniated Wheat & Corn Phosphate No. 2. Ammoniated Wheat & Corn Phosphate No. 2.	Muir. Coral.	{ G.† F.†	1.10 1.03	0.48 0.49	0.29 0.31	1.65 1.83	10.60 11.53	2.30 2.86	8.00 8.30 8.69
A 3433	Bean Grower.	Average.	{ G.† F.†	1.06	0.49	0.30	1.85	11.08	2.58	8.50
A 2601 A 3198	Complete Fertiliser. Complete Fertiliser.	Shepherd. Batavia. Eaton Rapids.	{ G.† F.†	1.00 0.50 0.50	0.35 0.16 0.20	0.32 0.35 0.31	1.65 0.82 1.01 1.01	10.30 13.03 13.55	1.20 1.76 1.42	8.00 10.00 11.27 12.13
A 3218 A 3294	Dissolved Bone Phosphate. Dissolved Bone Phosphate.	Average. Monroe. Yale.	{ G.† F.†	0.50	0.18	0.33	1.01	13.29	1.59	11.70 14.00 15.42 15.34
A 2881 A 2931 A 3219	General Crop Phosphate. General Crop Phosphate. General Crop Phosphate.	Average. New Boston. Carlton. Monroe.	{ G.† F.†	0.34 0.37 0.27 0.56	0.24 0.27 0.22	0.36 0.40 0.36	0.82 0.85 0.84 0.94	15.95	0.62	15.33 7.00 8.24 1.14 8.23 1.17 8.10 1.06
A 2604 A 2861 A 2876	High Grade Phosphate. High Grade Phosphate. High Grade Phosphate.	Average. Batavia. Beech. Romulus.	{ G.† F.†	0.34	0.24	0.36	0.94	9.58	1.36	8.22 16.00 17.35 18.40 17.85
A 3197 A 3261	New Rival Ammoniated Superphosphate 1916. New Rival Ammoniated Superphosphate 1916.	Average. Eaton Rapids. Fraser.	{ G.† F.†	0.46 0.49	0.17 0.23	0.22 0.30	0.82 0.87 1.02	18.60	0.70	17.90 9.00 9.79 1.16 9.58
A 3404	Sugar Beet Fertiliser.	Average.	{ G.† F.†	0.49	0.20	0.26	0.95	10.85	1.19	9.69 9.00 11.11
A 154* A 3124 A 3343	Universal Grain Grower 1916. Universal Grain Grower 1916. Universal Grain Grower 1916.	Average. Mason. Muir. Mason.	{ G.† F.†	0.65 0.61 0.52 0.42	0.17 0.15 0.19 0.27	0.32 0.26 0.20 0.29	0.82 1.02 0.81 0.88	12.25	1.14	8.00 9.62 9.51 9.76
		Average.	{ G.† F.†	0.52	0.20	0.25	0.97	11.22	1.59	9.63 1.12

†Abbreviations for Guaranteed and Found.

*Fall Samples.

FERTILIZER ANALYSES.

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A 1901 A 2980 A 3083 A 3450*	Red Line Phosphate. Red Line Phosphate. Red Line Phosphate. Red Line Phosphate.	{ G.† P.†					15.45 16.30 16.70 16.10	0.54 0.76 0.68 0.92	14.00 14.91 15.44 15.13
	Average.....						16.11	0.72	15.39
A 1983 A 1990 A 1997 A 2662 A 2711 A 2730 A 2896 A 2914 A 3005 A 3432*	Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate. Superior Acid Phosphate.	{ G.† P.†					17.20 17.40 18.65 19.28 18.20 18.30 18.00 18.65 18.70 18.55	0.60 0.64 0.58 0.78 0.78 0.14 0.96 0.60 0.16 0.68	16.00 16.60 16.76 18.07 18.50 17.42 18.16 17.04 18.06 18.84 17.87
	Average.....						18.29	0.59	17.70
A 177* A 2994 A 3135 A 3153	Triaton Fertilizer. Triaton Fertilizer. Triaton Fertilizer. Triaton Fertilizer.	{ G.† P.†	1.06 0.94 1.17 1.10	0.44 0.41 0.35 0.40	0.18 0.33 0.21 0.27	1.66 1.68 1.68 1.73 1.77	14.60 15.20 15.65 15.10	1.04 1.18 1.04 0.80	18.00 13.56 14.02 14.61 14.30
	Average.....		1.07	0.40	0.25	1.72	15.14	1.02	14.12
A 2958 A 3084 A 3185 A 3272 A 3521*	Usenmore Fertilizer. Usenmore Fertilizer. Usenmore Fertilizer. Usenmore Fertilizer. Usenmore Fertilizer.	{ G.† P.†					13.65 12.90 14.05 14.70 12.75	1.14 0.44 0.56 0.84 0.54	18.00 12.51 12.46 13.49 13.86 12.21
	Average.....						13.61	0.70	12.91
A 2883 A 3008	Wolverine Phosphate. Wolverine Phosphate.	{ G.† P.†					11.80 11.65	0.63 0.44	10.00 11.17 11.21
	Average.....						11.73	0.54	11.19
A 3136 A 3160	Michigan Carbon Works Homestead Brand. Beau Fertilizer 1916. Beau Fertilizer 1916.	{ G.† P.†	0.88 0.88	0.44 0.48	0.39 0.28	1.66 1.71 1.64	11.20 10.50	1.68 2.46	8.00 9.52 8.04
	Average.....		0.88	0.46	0.34	1.68	10.85	2.07	8.78

*Abbreviations for Guaranteed and Found.

*Fall Samples.

FERTILIZER ANALYSES.

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A 2742	Sugar Beet Fertilizer 1916.	{ G.† F.†	0.50	0.18	0.30	0.89	10.75	1.40	9.00	1.00
A 3254	Sugar Beet Fertilizer 1916.	{ G.† F.†	0.33	0.20	0.35	0.88	10.90	1.20	9.70	1.18
A 3307	Sugar Beet Fertilizer 1916.	{ G.† F.†	0.54	0.20	0.26	1.00	12.43	1.54	10.89	1.15
	Michigan State Grange Brands.									
	Average.		0.46	0.19	0.30	0.95	11.36	1.38	9.98	1.11
A 2907	All Crops Special Fertilizer 1916.	{ G.† F.†	0.49	0.20	0.33	0.89	11.80	1.86	8.00	1.00
A 2910	All Crops Special Fertilizer 1916.	{ G.† F.†	0.41	0.24	0.29	0.94	10.50	0.68	9.94	1.22
A 3142	All Crops Special Fertilizer 1916.	{ G.† F.†	0.50	0.19	0.26	0.95	10.60	1.16	9.82	1.21
A 3237	All Crops Special Fertilizer 1916.	{ G.† F.†	0.43	0.20	0.25	0.88	10.03	1.18	8.86	1.15
A 3661*	All Crops Special Fertilizer 1916.	{ G.† F.†	0.61	0.13	0.21	0.95	10.45	1.62	8.83	0.95
	Average.		0.49	0.19	0.27	0.95	10.68	1.30	9.38	1.13
A 3227	Complete Manure.	{ G.† F.†	0.42	0.25	0.27	0.82	10.05	1.38	7.00	1.00
A 3251	Complete Manure.	{ G.† F.†	0.48	0.24	0.29	0.94	9.10	0.80	8.30	1.08
	Average.		0.45	0.25	0.28	0.98	9.58	1.09	8.49	1.10
A 3265	Corn & Oats Fertilizer.	{ G.† F.†	0.88	0.50	0.30	1.65	11.25	1.92	8.00	.....
A 3562*	Corn & Oats Fertilizer.	{ G.† F.†	1.04	0.36	0.26	1.66	10.65	2.10	8.55	.....
	Average.		0.95	0.43	0.28	1.66	10.95	1.96	8.99	.....
A 171*	High Grade Phosphate and Potash.	{ G.† F.†	.....	.....	.....	.....	.....	.....	12.00	1.00
A 2777	High Grade Phosphate and Potash.	{ G.† F.†	.....	.....	.....	.....	13.55	0.44	13.11	1.32
A 2905	High Grade Phosphate and Potash.	{ G.† F.†	.....	.....	.....	.....	13.40	0.80	12.60	1.42
A 2906	High Grade Phosphate and Potash.	{ G.† F.†	.....	.....	.....	.....	14.10	0.54	13.56	1.12
A 3561*	High Grade Phosphate and Potash.	{ G.† F.†	.....	.....	.....	.....	13.75	0.46	13.29	1.13
	Average.		.....	.....	.....	.....	13.13	0.66	12.47	1.41
	Average.		.....	.....	.....	.....	13.59	0.58	13.01	1.28
A 3250	IX Fertilizer.	{ G.† F.†	0.53	0.20	0.25	0.89	12.60	1.38	10.00	.....
A 3264	IX Fertilizer.	{ G.† F.†	0.60	0.24	0.17	1.01	12.65	1.50	11.15	.....
	Average.		0.57	0.22	0.21	1.00	12.63	1.44	11.19	.....
A 170*	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	.....	.....	14.00	.....
A 2690	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	15.95	0.36	15.59	.....
A 2909	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	16.30	0.54	15.76	.....
A 3236	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	16.25	0.64	15.61	.....
A 3253	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	16.60	0.46	16.14	.....
A 3543*	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	15.63	0.68	14.95	.....
A 3642*	Wheat Fertilizer No. 1.	{ G.† F.†	.....	.....	.....	.....	15.80	0.96	14.84	.....
	Average.		.....	.....	.....	.....	15.85	0.48	15.37	.....
	Average.		.....	.....	.....	.....	16.05	0.59	15.46	.....

Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.	Available.	
Michigan State Grange Brands.—Continued.										
A 3351	Wheat Fertilizer No. 2.....	Devotion.....	{ G. P. }				12.15	0.72	10.00 11.43	
A 2669	Acid Phosphate 10%.....	Romero.....	{ G. P. }				10.98	0.56	10.00 10.42	
A 3214	Bean Grower.....	Detroit.....	{ G. P. }	0.46	0.37	1.65 1.70	10.75	2.32	8.00 8.43	1.00 1.26
A 2780	Dissolved Bone Phosphate.....	Adrian.....	{ G. P. }				16.20	0.82	14.00 15.38	
A 2926	Dissolved Bone Phosphate.....	Milan.....					16.35	0.58	15.77	
	Average.....						16.28	0.70	15.58	
A 3337	General Crop Fertilizer.....	Imley City.....	{ G. P. }	0.16	0.30	0.88 1.12	12.65	1.46	10.00 11.19	1.00 1.23
A 3271	Grain and Grass Grower.....	Richmond.....	{ G. P. }	0.26	0.34	0.88	9.15	1.32	7.00 7.83	1.00 1.00
A 3286	Grain and Grass Grower.....	Emmett.....	0.44	0.23	0.35	1.02	9.06	1.06	7.99	1.02
	Average.....		0.40	0.25	0.34	0.99	9.10	1.19	7.91	1.01
A 2779	High Grade Phosphate.....	Adrian.....	{ G. P. }				17.65	0.86	16.00	
A 2839	High Grade Phosphate.....	Plymouth.....					18.95	0.82	16.79	
A 2923	High Grade Phosphate.....	Willis.....					18.90	0.90	18.13	
A 2963	High Grade Phosphate.....	Mayhew.....					17.80	0.32	17.48	
	Average.....						13.33	0.73	17.60	
A 2924	Wheat and Corn Producer 1916.....	Milan.....	{ G. P. }	0.21	0.26	0.88	11.45	1.54	9.00	1.00
A 2667.	Wheat and Corn Producer 1916.....	Monroe.....	0.61	0.13	0.27	0.91	10.23	1.41	9.91 8.82	1.16 1.12
	Average.....		0.56	0.17	0.26	0.99	10.84	1.48	9.36	1.14

FERTILIZER ANALYSES.

Northwestern Horsehoe Brands.		Union City.		Reading.		Memphis.		Amador.		Average.	
		{ F.	{ P.								
A 167*	Acidulated Bone Phosphate and Potash	0.53	0.15	0.22	12.00	1.16	10.00	1.00	1.41	10.84	1.00
A 2709	Acidulated Bone Phosphate and Potash	0.46	0.16	0.25	12.85	1.72	11.34	1.37	1.47	11.34	1.37
A 2802	Acidulated Bone Phosphate and Potash	0.60	0.18	0.30	13.55	1.48	11.89	1.24	1.24	11.89	1.24
A 2811	Acidulated Bone Phosphate and Potash	0.60	0.21	0.27	13.58	1.68	11.72	1.04	1.04	11.72	1.04
A 2912	Acidulated Bone Phosphate and Potash	0.63	0.19	0.28	13.20	1.40	11.80	1.16	1.16	11.80	1.16
	Average	0.59	0.18	0.26	13.00	1.52	11.48	1.24			
A 196*	Animal Bone Phosphate Manure	0.53	0.10	0.21	8.8	0.60	7.50	1.00			
A 3278	Animal Bone Phosphate Manure	0.41	0.26	0.26	8.10	0.80	7.50	1.20			
A 3363	Animal Bone Phosphate Manure	0.44	0.32	0.18	9.70	1.08	8.62	1.03			
	Average	0.46	0.23	0.21	8.92	1.15	7.77	1.08			
A 3123	Beau Special 1916.	0.97	0.48	0.42	11.05	2.20	8.85	1.33			
	Carson City	1.65	1.87	1.05	2.30		8.00	1.00			
A 117*	Corn and Wheat Grower 1916.	0.85	0.47	0.41	10.25	1.86	8.00	1.00			
A 2764	Corn and Wheat Grower 1916.	0.79	0.49	0.39	10.75	2.08	8.39	1.18			
A 3160	Corn and Wheat Grower 1916.	0.96	0.44	0.42	10.75	1.64	8.67	1.60			
A 3365	Corn and Wheat Grower 1916.	1.04	0.43	0.27	10.60	1.32	9.11	1.34			
A 3606*	Corn and Wheat Grower 1916.	0.61	0.54	0.58	10.95	1.88	9.28	1.17			
	Average	0.85	0.48	0.41	10.66	1.76	8.90	1.34			
A 118*	Corn and Wheat Grower 1918.	1.14	0.37	0.30	11.06	2.22	8.00	1.00			
A 3386	Corn and Wheat Grower 1918.	1.11	0.35	0.30	10.80	1.08	8.83	1.33			
	Average	1.13	0.36	0.30	10.93	1.65	9.28	1.08			
A 169*	Dissolved Ammoniated Bone Phosphate.	1.08	0.44	0.28	15.05	1.16	18.00	1.00			
A 2816	Dissolved Ammoniated Bone Phosphate.	1.19	0.40	0.29	15.88	1.06	13.89	1.39			
A 3329	Dissolved Ammoniated Bone Phosphate.	1.16	0.49	0.23	15.20	0.94	14.64	1.06			
	Average	1.14	0.44	0.27	15.32	1.06	14.27	1.16			
A 120*	F. and F. Fertilizer	0.45	0.17	0.21	11.80	0.72	10.08	1.08			
A 2689	F. and F. Fertilizer	0.49	0.19	0.26	12.30	1.08	11.22	1.08			
A 2707	F. and F. Fertilizer	0.65	0.21	0.15	12.60	1.52	12.60	1.52			
A 2728	F. and F. Fertilizer	0.42	0.30	0.28	13.65	1.58	12.07	1.08			
A 2803	F. and F. Fertilizer	0.43	0.22	0.30	13.95	1.84	12.11	1.84			
A 2814	F. and F. Fertilizer	0.57	0.19	0.25	13.65	2.06	11.89	1.89			
A 2838	F. and F. Fertilizer	0.31	0.23	0.26	12.95	1.76	11.19	1.19			
	Average	0.47	0.20	0.25	12.99	1.51	11.48	1.48			

¹Abbreviations for Guaranteed and Found.
²Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.		Potash.	
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.		Insoluble.	Available.	Water Soluble.
Northwestern Horseshoe Brand.—Con.									
A 166*	Garden City Superphosphate with Potash.	Union City.	0.84	0.4	0.39	1.65	10.65	8.00	1.00
A 3164	Garden City Superphosphate with Potash.	Coloma.	0.80	0.4	0.40	1.67	10.80	9.09	1.23
		Average.	0.82	0.4	0.39	1.69	10.73	9.06	1.26
A 2688	16% Phosphate.	Coldwater.						16.00	
A 2706	16% Phosphate.	Reading.					18.28	17.06	
A 2806	16% Phosphate.	Stephenson.					18.15	17.43	
A 2812	16% Phosphate.	Petokey.					19.70	18.94	
A 3470*	16% Phosphate.	Filmore.					19.30	18.42	
A 3605*	16% Phosphate.	North Adams.					18.70	17.58	
		Average.					18.95	18.13	
							18.84	0.92	17.92
A 193*	2 Potash Fertiliser.	Reading.	0.62	0.10	0.19	0.89	10.75	8.00	2.00
A 2687	2 Potash Fertiliser.	Coldwater.	0.52	0.13	0.16	0.81	9.30	9.61	1.98
A 2765	2 Potash Fertiliser.	Adrian.	0.36	0.24	0.38	0.98	10.40	8.68	1.63
A 2813	2 Potash Fertiliser.	Petokey.	0.34	0.22	0.38	0.94	10.65	8.62	2.27
		Average.	0.46	0.17	0.28	0.91	10.28	9.10	1.99
A 168*	Potash Manure 1916.	Union City.	0.55	0.18	0.24	0.89	12.23	8.00	1.00
A 2708	Potash Manure 1916.	Reading.	0.42	0.20	0.31	0.97	10.58	11.09	1.39
A 2729	Potash Manure 1916.	Hilldale.	0.49	0.20	0.32	1.01	11.10	9.56	1.30
A 2971	Potash Manure 1916.	Saline.	0.20	0.27	0.40	0.87	11.80	9.98	1.13
		Average.	0.42	0.21	0.32	0.95	11.43	10.78	1.23
							11.43	10.35	1.26
A 2763	Quick Acting Phosphate.	Adrian.					11.30	10.00	
A 2946	Quick Acting Phosphate.	New Boston.					11.15	10.76	
A 3379	Quick Acting Phosphate.	Willnot.					11.05	10.61	
		Average.					11.20	10.20	
							0.04	10.56	

FERTILIZER ANALYSES.

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A 2887	Square Deal Phosphate.....	{ G.†							14.00	
A 3270	Square Deal Phosphate.....	{ F.†							15.75	
A 3277	Square Deal Phosphate.....								15.75	
	Richmond.....								15.20	
	Memphis.....								14.72	
	Average.....								15.80	0.64
									0.82	
A 3217	Sugar Beet Fertilizer 1916.....	{ G.†							9.85	1.02
A 3330	Sugar Beet Fertilizer 1916.....	{ F.†							10.25	0.82
									0.93	
	Average.....								10.05	0.92
									14.65	0.56
A 2804	XXX Fertilizer.....	{ G.†							13.65	0.52
A 3244	XXX Fertilizer.....	{ F.†							14.15	0.54
									0.82	
	Average.....								11.45	0.78
A 199*	Ammoniated Bone Phosphate and Potash.....	{ G.†							12.80	1.44
A 3350	Ammoniated Bone Phosphate and Potash.....	{ F.†							13.75	1.92
A 3391	Ammoniated Bone Phosphate and Potash.....								1.01	1.38
									1.65	
A 3414	Corn and Wheat Grower 1918.....	{ G.†							10.25	2.12
A 3486*	Corn and Wheat Grower 1918.....	{ F.†							1.67	1.80
									1.73	1.96
	Average.....								1.65	
A 3415	Corn and Wheat Grower 1918.....	{ G.†							11.50	3.10
A 3485*	Corn and Wheat Grower 1918.....	{ F.†							1.78	2.34
									1.78	
	Average.....								11.48	2.72
									0.82	
A 2703	Faultless Grain Grower.....	{ G.†							9.35	1.42
A 2735	Faultless Grain Grower.....	{ F.†							9.55	1.42
A 3109	Faultless Grain Grower.....								9.45	1.40
A 3491*	Faultless Grain Grower.....								9.65	1.42
A 3610*	Faultless Grain Grower.....								9.40	1.02
									1.00	1.34
	Average.....								9.48	8.14
									16.00	0.50
A 3111	Gilt Edge Phosphate.....	{ G.†							14.00	
		{ F.†							15.50	

†Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.	Available.	Water soluble.
A 2704 A 2849 A 2897 A 2960 A 3110	Peckers Bears Head Brand.—Con.	Litchfield { F. }	0.64	0.21	0.30	0.82	12.88	1.94	10.00	.....
		Stark.	0.53	0.19	0.26	0.91	13.30	1.64	10.94	.....
		Wells.	0.49	0.20	0.22	0.91	13.30	1.94	11.36	.....
		Willis.	0.75	0.18	0.14	1.07	13.05	2.28	10.77	.....
		Harlem.	0.55	0.14	0.25	0.94	12.40	1.76	10.64	.....
		Average.	0.59	0.18	0.24	1.01	12.96	1.91	11.06	.....
A 2900 A 2728 A 3357	New Compound and Potash Fertilizer New Compound and Potash Fertilizer New Compound and Potash Fertilizer	Pittsford. { F. }	0.58	0.13	0.24	0.82	10.40	1.28	8.00	2.00
		Oneco.	0.38	0.25	0.27	1.00	11.30	1.58	9.12	2.10
		Fowler.	0.50	0.18	0.33	1.01	10.05	1.40	9.32	1.96
		Average.	0.49	0.19	0.31	0.99	10.55	1.52	9.08	2.01
		Litchfield. { F. }	.....	.....	.....	.....	17.80	0.88	16.00	.....
		McGinn Brown City	.....	.....	.....	.....	18.05	0.82	17.45	.....
A 2705 A 3143 A 3298	16% Phosphate 16% Phosphate 16% Phosphate	Average.	.....	.....	.....	.....	18.07	0.75	17.32	.....
		Dozier. { F. }	.....	.....	.....	.....	12.75	0.72	12.03	1.00
		Holland. { F. }	.....	.....	.....	.....	10.90	0.70	10.20	2.46
		Pontiac. { F. }	1.10	0.48	0.26	1.65	15.75	0.58	15.00	.....
		Vernon.	1.23	0.44	0.25	1.92	14.81	1.40	14.98	.....
		Harlem.	1.14	0.33	0.29	1.76	15.15	1.70	13.41	.....
A 3427 A 3416 A 3390 A 3393 A 3492	Phosphatash Fertilizer Soluble Phosphate Sucrose Fertilizer Sucrose Fertilizer Sucrose Fertilizer	Average.	1.18	0.42	0.26	1.84	15.34	1.32	13.92	.....
		Dozier. { F. }	.....	.....	.....	.....	12.75	0.72	12.03	1.00
		Holland. { F. }	.....	.....	.....	.....	10.90	0.70	10.20	2.46
		Pontiac. { F. }	1.10	0.48	0.26	1.65	15.75	0.58	15.00	.....
		Vernon.	1.23	0.44	0.25	1.92	14.81	1.40	14.98
		Harlem.	1.14	0.33	0.29	1.76	15.15	1.70	13.41

FERTILIZER ANALYSES.

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A 3285	Sugar Beet Grower 1916.....	{ G.† F.†	0.45	0.17	0.29	0.91	10.00	0.84	9.00	1.00
A 3297	Sugar Beet Grower 1916.....	{ G.† F.†	0.40	0.19	0.39	0.88	10.75	1.22	9.53	1.01
A 3401	Sugar Beet Grower 1916.....	{ G.† F.†	0.41	0.23	0.36	1.00	11.30	1.02	10.28	1.01
A 3403	Sugar Beet Grower 1916.....	{ G.† F.†	0.56	0.18	0.31	1.05	13.05	1.44	11.61	1.16
	Average.....		0.43	0.19	0.34	0.96	11.28	1.13	10.15	1.09
A 2850	Sure Growth Potash Manure 1916.....	{ G.† F.†	0.40	0.23	0.37	0.88	10.60	1.52	8.00	1.00
A 3313	Sure Growth Potash Manure 1916.....	{ G.† F.†	0.49	0.18	0.28	0.95	10.85	1.28	9.06	1.24
A 3402	Sure Growth Potash Manure 1916.....	{ G.† F.†	0.42	0.21	0.34	0.97	11.05	1.04	9.57	1.18
A 3555*	Sure Growth Potash Manure 1916.....	{ G.† F.†	0.43	0.13	0.25	1.01	11.55	1.06	10.01	1.08
A 3801*	Sure Growth Potash Manure 1916.....	{ G.† F.†	0.55	0.18	0.21	0.94	11.10	1.46	10.49	1.27
	Average.....		0.46	0.18	0.33	0.97	11.08	1.27	9.76	1.21
A 3340	World of Good Superphosphate with Potash.....	{ G.† F.†	1.02	0.65	0.23	1.66	11.15	2.00	8.00	1.00
	Armour Fertilizer Works, Chicago, Ill.					1.90			9.15	1.35
A 143*	Acid Phosphate.....	{ G.† F.†							16.00	
A 2755	Acid Phosphate.....	{ G.† F.†					18.00	0.14	17.86	
A 3037	Acid Phosphate.....	{ G.† F.†					17.05	0.44	16.61	
A 3064	Acid Phosphate.....	{ G.† F.†					17.13	1.99	16.14	
A 3478*	Acid Phosphate.....	{ G.† F.†					17.70	2.53	16.12	
	Average.....						18.50	1.34	17.16	
A 142*	Ammoniated Phosphate No. 2.....	{ G.† F.†	0.80	0.66	0.20	1.66	17.68	1.30	16.38	
A 2753	Ammoniated Phosphate No. 2.....	{ G.† F.†	0.83	0.51	0.40	1.95	11.50	1.88	10.00	
A 3041	Ammoniated Phosphate No. 2.....	{ G.† F.†	0.81	0.49	0.24	1.44	11.75	2.07	10.22	
A 3066	Ammoniated Phosphate No. 2.....	{ G.† F.†	0.88	0.47	0.18	1.53	12.90	1.46	9.88	
A 3655*	Ammoniated Phosphate No. 2.....	{ G.† F.†	0.70	0.51	0.21	1.42	11.85	1.28	11.44	
	Average.....		0.74	0.53	0.25	1.82	12.06	1.38	10.87	
A 2727	Bone Meal.....	{ G.† F.†	0.72	1.14	0.97	1.65	12.06	1.51	10.55	
A 3751	Bone Meal.....	{ G.† F.†	0.65	1.24	0.97	2.53	27.00			
A 3058	Bone Meal.....	{ G.† F.†	0.76	1.01	0.27	2.29	23.75			
A 3068	Bone Meal.....	{ G.† F.†	0.49	1.10	0.80	2.04	27.30			
A 3040	Bone Meal.....	{ G.† F.†	0.36	0.63	0.37	2.39	27.70			
	Average.....		0.60	1.02	0.52	1.46	32.60			

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid		Potash.	
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.
Armour Fertilizer Works, Chicago, Ill.—Con.										
A 2857	Cereal Phosphate.	Grand Blanc.	{ G.†						10.00	
A 2877	Cereal Phosphate.	Belleville.	{ F.†				11.25	0.28	10.97	
A 3161	Cereal Phosphate.	Watervliet.					10.65	0.48	10.27	
		Average.					10.88	0.50	10.38	
A 122*	Grain & Bean Special.	Cape.	{ G.†	0.46	0.41	0.88			8.00	2.00
A 2754	Grain & Bean Special.	Hudson.	{ F.†	0.26	0.25	1.05	9.85	1.16	8.79	1.63
A 3027	Grain & Bean Special.	Plainwell.		0.51	0.22	0.90	9.25	1.48	7.77	2.04
A 3137	Grain & Bean Special.	Grand Rapids.		0.68	0.35	0.90	9.40	1.08	8.32	1.81
A 3576*	Grain & Bean Special.	Carson City.		0.52	0.37	0.81	9.70	1.18	8.52	1.96
		Average.		0.39	0.35	0.91	9.25	0.90	8.35	2.05
A 2867	Grain Grower.	Wayne.	{ G.†			1.65	9.51	1.16	8.35	1.90
A 3138	Grain Grower.	Grand Rapids.	{ F.†	1.16	0.45	1.90	8.38		8.00	2.21
A 3465*	Grain Grower.	Zealand.		0.72	0.51	1.63	11.20	1.82	8.50	2.21
A 3804*	Grain Grower.	Richland.		0.43	0.66	1.74	12.25	3.10	9.15	2.08
		Average.		1.04	0.54	1.88	11.00	2.60	8.40	2.00
A 3628*	High Grade Ammoniated Phosphate.	Hudson.	{ G.†	0.84	0.55	1.79	10.71	2.56	8.15	2.02
			{ F.†	0.79	0.74	1.65			12.00	
A 128*	Michigan Special.	Easton Rapids.	{ G.†			1.94	15.05	2.72	12.33	
A 2673	Michigan Special.	Lansing.	{ F.†	0.57	0.51	0.82	9.95	1.58	8.00	1.00
A 2752	Michigan Special.	Hudson.		0.52	0.37	1.05	9.53	1.34	8.29	1.41
A 2784	Michigan Special.	Bladfield.		0.40	0.28	0.93	10.40	1.60	8.80	1.20
A 3028	Michigan Special.	Plainwell.		0.51	0.38	1.13	9.95	1.68	8.27	1.01
A 3055	Michigan Special.	Dowagiac.		0.35	0.35	0.95	10.90	1.18	9.72	1.16
A 3464*	Michigan Special.	Zealand.		0.46	0.35	1.02	9.60	1.22	8.38	1.08
		Average.		0.49	0.44	1.11	9.98	2.18	7.80	1.17
			0.43	0.38	0.20	1.01	10.04	1.52	8.52	1.15

FERTILIZER ANALYSES.

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A 3556	Phosphate and Potash Special	Grand Blanc	{ G.† F.†	11.32	0.66	10.66	1.00
A 3213	Phosphate and Potash Special	Detroit	{ G.† F.†	11.05	0.44	10.61	0.97
A 3283	Phosphate and Potash Special	Yale	{ G.† F.†	.....	.....	.....	.....	.....	.....	11.25	0.72	10.53	0.94
A 3520	Phosphate and Potash Special	Charlotte	{ G.† F.†	.....	.....	.....	.....	.....	.....	11.85	1.14	10.71	1.26
	Average			.....	.....	.....	.....	.....	.....	11.32	0.66	10.66	0.98
A 1999	Sheep Manure	Portage	{ G.† F.†	.....	.....	.....	.....	.....	.....	1.24	.....	1.00	1.00
A 3001	Sheep Manure	Portage	{ G.† F.†	0.18	0.46	0.97	0.18	.....	.....	1.60	0.18	1.42	1.58
A 3002	Sheep Manure	Portage	{ G.† F.†	0.43	0.70	0.96	2.09	.....	.....	3.10	0.65	2.44	1.60
	Average			0.31	0.55	0.92	1.78	.....	.....	2.75	0.26	2.49	1.42
A 3596	Special Grain Grower	Dowagiac	{ G.† F.†	0.31	0.57	0.95	1.83	.....	.....	2.48	0.37	2.12	1.53
A 3702	Special Grain Grower	Mason	{ G.† F.†	0.69	0.50	0.27	1.46	.....	.....	10.40	1.62	8.00	1.00
	Average			0.65	0.47	0.37	1.39	.....	.....	11.00	2.36	8.64	1.33
A 2756	Standard	Hudson	{ G.† F.†	0.87	0.49	0.27	1.43	.....	.....	10.70	1.99	8.71	1.23
A 3020	Standard	Portage	{ G.† F.†	0.38	0.29	0.20	0.88	.....	.....	9.15	1.30	8.00	2.98
A 3031	Standard	Dexter	{ G.† F.†	0.56	0.28	0.11	0.95	.....	.....	9.45	0.82	7.85	3.18
A 3052	Standard	Decatur	{ G.† F.†	0.41	0.38	0.28	1.07	.....	.....	10.45	1.20	9.25	2.32
A 3139	Standard	Grand Rapids	{ G.† F.†	0.46	0.39	0.26	1.11	.....	.....	9.75	0.96	8.79	3.14
A 3173	Standard	Baroda	{ G.† F.†	0.32	0.25	0.20	0.77	.....	.....	10.40	1.68	8.72	3.69
	Average			0.34	0.33	0.16	0.83	.....	.....	8.75	0.62	8.13	2.77
A 3036	Star Phosphate	Allegan	{ G.† F.†	0.41	0.32	0.20	0.93	.....	.....	9.66	1.10	8.56	3.01
A 3098	Star Phosphate	Coopersville	{ G.† F.†	.....	.....	.....	.....	.....	.....	16.65	1.24	14.00	.....
A 3206	Star Phosphate	Ann Arbor	{ G.† F.†	.....	.....	.....	.....	.....	.....	16.80	1.32	15.48	.....
A 3477	Star Phosphate	Coopersville	{ G.† F.†	.....	.....	.....	.....	.....	.....	16.55	1.75	14.80	.....
	Average			.....	.....	.....	.....	.....	.....	17.00	0.98	16.02	.....
A 121	Wheat, Corn and Oats Special	Caspac	{ G.† F.†	.....	.....	.....	.....	.....	.....	16.75	1.32	15.43	.....
A 2672	Wheat, Corn and Oats Special	Lansing	{ G.† F.†	0.46	0.43	0.08	0.88	.....	.....	9.95	1.94	7.00	1.00
A 2866	Wheat, Corn and Oats Special	Wayne	{ G.† F.†	0.41	0.36	0.20	0.97	.....	.....	8.83	1.06	8.01	0.74
A 3028	Wheat, Corn and Oats Special	Plainwell	{ G.† F.†	0.51	0.32	0.21	1.04	.....	.....	10.00	1.28	8.72	0.92
A 3039	Wheat, Corn and Oats Special	Hudsonville	{ G.† F.†	0.56	0.32	0.24	1.13	.....	.....	9.50	1.22	8.28	0.83
A 3479	Wheat, Corn and Oats Special	Coopersville	{ G.† F.†	0.33	0.26	0.20	0.79	.....	.....	9.55	1.38	8.17	1.96
	Average			0.30	0.30	0.30	0.90	.....	.....	8.50	1.43	7.07	0.88
	Average			0.43	0.33	0.21	0.97	.....	.....	9.39	1.39	8.00	0.96

Abbreviations for Guaranteed and Found.
*Fall Samples.

FERTILIZER ANALYSES.

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4-12-3 Fertilizer		G.†				3.50		12.00	8.00
Tuscarora Brands.									
A 3062	Acid Phosphate.	{ G.† P.† }					16.45	14.00	
								14.70	
A 3067	Special Corn, Wheat & Bean Grower.	{ G.† P.† }	0.52	0.35	0.25	0.88	10.80	8.00	1.00
A 3701*	Special Corn, Wheat & Bean Grower.		0.47	0.40	0.18	1.05	9.40	8.92	1.27
								8.28	1.58
	Average.		0.50	0.38	0.21	1.09	10.10	8.60	1.41
	Special Standard.	G.†				1.68		8.00	1.00
	Standard.	G.†				1.68		8.00	8.00
A 3068	Tankage and Phosphate.	{ G.† P.† }	1.15	0.69	0.42	1.68	13.35	10.00	
	1-10 Fertilizer.	G.†				2.26		9.94	
						0.89		10.00	
The Barrett Co., New York City, N. Y.									
A 2166	Arcadian Sulfate of Ammonia.	{ G.† P.† }				20.75			
A 2208	Arcadian Sulfate of Ammonia.					20.46			
						20.82			
	Average.					20.84			
A 2411	Blood and Bone Fertilizer.	{ G.† P.† }	3.02	1.39	0.63	8.25	19.17		
						5.84	19.85		
A 3382	Ammoniated Phosphate.	{ G.† P.† }	1.37	0.40	0.13	1.68	18.85	12.00	
A 3607*	Ammoniated Phosphate.		0.84	0.78	0.39	1.90	20.45	14.75	
						2.01		7.91	
	Average.		1.11	0.59	0.26	1.96	19.65	11.38	
A 3170	Meat and Bone Phosphate.	{ G.† P.† }	0.86	3.35	1.61	5.88	11.68	5.29	
						5.82			
Calumet Fertilizer Co., New Albany, Indiana.									
A 3034	Acid Phosphate.	{ G.† P.† }					15.55	14.00	
A 3057	Acid Phosphate.						16.65	14.95	
A 3239	Acid Phosphate.						18.86	15.81	
A 3379	Acid Phosphate.						15.70	15.15	
								14.78	
	Average.						16.69	15.17	

Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.		Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.
Calumet Fertilizer Co.—Con.									
A 138*	16% Acid Phosphate.	Eaton Rapids.	{ G.†					16.00	
A 3589*	16% Acid Phosphate.	Lewton.	{ F.†					16.28	
		Average.						17.78	
A 3243	Black Soil Special.	Lulu.	{ G.†	0.10	0.22	0.42		5.00	5.00
A 3423	Black Soil Special.	Wayland.	{ F.†	0.13	0.28	0.41	5.83	5.07	4.51
		Average.		0.11	0.25	0.51	7.45	6.41	4.43
A 3501*	Bone Meal Tankage and Potash.	Zeeland.	{ G.†	0.07	0.60	1.24	6.64	5.74	4.47
			{ F.†			1.00	16.00		1.00
A 137*	Bone Phosphate & Potash Mixture.	Eaton Rapids.	{ G.†	0.11	0.20	0.42		10.00	1.00
A 2908	Bone Phosphate & Potash Mixture.	Flat Rock.	{ F.†	0.04	0.19	0.36	13.20	1.78	10.42
A 2977	Bone Phosphate & Potash Mixture.	Britton.		0.04	0.23	0.35	12.35	1.56	10.79
A 3068	Bone Phosphate & Potash Mixture.	Niles.		0.20	0.08	0.44	12.65	1.36	11.29
A 3466*	Bone Phosphate & Potash Mixture.	Zeeland.		0.13	0.27	0.32	13.60	2.80	10.80
		Average.		0.11	0.23	0.46	14.65	1.54	13.11
A 2975	Coburn's Special with Potash.	Britton.	{ G.†	0.08	0.15	0.60	13.29	1.81	11.48
A 3248	Coburn's Special with Potash.	Petersburg.	{ F.†	0.09	0.14	0.63	10.45	0.78	9.67
A 3280	Coburn's Special with Potash.	Memphis.		0.09	0.39	0.92	10.00	1.42	8.58
A 3240	Coburn's Special with Potash.	Lulu.		0.07	0.35	0.88	10.15	1.58	8.57
		Average.		0.08	0.41	0.93	11.15	1.30	9.85
	Extra Ammoniated Bone Phosphate.			0.08	0.38	0.92	10.44	1.27	9.17
			{ G.†			1.64		18.00	
A 116*	Grain Grower.	Imley City.	{ G.†	1.15	0.23	1.61	9.90	1.04	8.00
A 158*	Grain Grower.	Mason.	{ F.†	1.11	0.22	1.55	10.60	1.36	8.36
A 3574*	Grain Grower.	Carson City.		1.24	0.22	1.66	10.30	1.31	8.99
		Average.		1.17	0.22	1.61	10.27	1.40	8.87
									2.13

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A 2976	Half Six Three.	(G.†	0.10	0.12	0.34	0.56	7.55	1.12	6.00	3.00
A 3241	Half Six Three.	{ F.†	0.03	0.12	0.27	0.44	6.90	0.90	6.43	2.94
A 3242	Half Six Three.		0.14	0.17	0.15	0.46	8.00	1.52	6.48	2.57
A 3252	Half Six Three.		0.11	0.12	0.23	0.46	7.30	1.12	6.18	2.56
A 3354	Half Six Three.		0.08	0.14	0.38	0.60	8.45	1.18	7.27	3.05
	Average.		0.10	0.13	0.27	0.50	7.64	1.17	6.47	2.77
A 132*	Half-Ten-Two.	(G.†	0.09	0.09	0.23	0.41	12.35	1.58	10.00	2.00
		{ F.†							10.77	1.71
A 136*	Half Thirteen One.	(G.†	0.06	0.10	0.24	0.42	15.35	2.16	13.00	1.00
A 3571*	Half Thirteen One.	{ F.†	0.03	0.10	0.31	0.46	15.35	2.20	13.19	0.88
	Average.		0.07	0.10	0.27	0.44	15.35	2.18	13.17	0.94
A 115*	High Grade Manure.	(G.†	0.85	0.20	0.26	1.23	11.35	2.16	9.00	1.00
A 3178	High Grade Manure.	{ F.†	0.62	0.25	0.52	1.39	11.35	1.64	9.19	1.23
A 3281	High Grade Manure.		0.36	0.21	0.38	0.95	10.80	1.82	9.71	1.00
A 3311	High Grade Manure.		0.53	0.19	0.50	1.22	11.85	1.40	8.98	0.95
	Average.		0.50	0.21	0.42	1.22	11.34	1.76	9.58	1.08
A 3134	Union and Beet Grower.	(G.†	1.26	0.19	0.39	1.64	7.65	0.68	6.00	2.00
A 3193	Union and Beet Grower.	{ F.†	1.22	0.18	0.34	1.74	8.10	1.42	6.97	2.04
A 3242	Union and Beet Grower.		1.03	0.25	0.38	1.66	8.10	1.22	6.68	2.13
A 3425	Union and Beet Grower.		0.96	0.19	0.36	1.51	8.55	1.06	6.88	2.17
	Average.		1.12	0.20	0.37	1.69	8.10	1.09	7.49	1.74
A 3424	Phosphate and Potash.	(G.†		0.20	0.37				7.01	2.02
		{ F.†					11.60	0.74	10.00	2.00
A 2891	Special Crop Grower.	(G.†	0.04	0.14	0.30	0.41	14.20	0.84	13.00	
A 3035	Special Crop Grower.	{ F.†	0.15	0.12	0.26	0.53	14.80	0.94	13.36	
A 3069	Special Crop Grower.		0.22	0.07	0.22	0.51	15.00	2.66	13.86	
A 3247	Special Crop Grower.		0.18	0.13	0.25	0.59	13.70	0.92	12.34	
	Average.		0.15	0.12	0.26	0.53	14.43	1.34	12.78	
A 3179	Special Dissolved Bone & Potash.	(G.†							13.09	
A 3246	Special Dissolved Bone & Potash.	{ F.†					15.40	0.80	13.00	1.00
A 3309	Special Dissolved Bone & Potash.						15.35	1.50	13.85	1.05
	Average.						15.40	0.88	14.52	1.19
							15.38	1.06	14.32	1.12

Abbreviations for Guaranteed and Found.
*Full Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Insoluble.	Available.	Water Soluble.
A 3344 A 3426	Calumet Fertilizer Co.—Con. Special Pure Bone Meal Special Pure Bone Meal	Mason Wayland	{ G.† P.†	0.31 0.36	0.57 0.59	0.23 0.27	0.82 1.11 1.24	30.00 31.30 28.83	.....
		Average	0.35	0.58	0.25	1.18	30.32	.....	.....
		Mason Clio	{ G.† P.†	.....	.....	.....	12.45 14.35	10.00 10.87 11.95	4.00 3.37 4.26
A 157* A 3683*	Ten Four Ten Four	Average	.....	.....	.....	.....	13.40	11.41	3.82
A 114* A 135* A 156* A 194* A 2468* A 3502* A 3559*	Chicago Feed & Fertilizer Co., Chicago, Ill. Wheat, Corn and Oat Special Wheat, Corn and Oat Special Wheat, Corn and Oat Special Wheat, Corn and Oat Special Wheat, Corn and Oat Special Wheat, Corn and Oat Special Wheat, Corn and Oat Special	Imlay City Eaton Rapids Mason Reading Zealand Zealand St. Johns	{ G.† P.†	0.06 0.07 0.12 0.05 0.04 0.09 0.11	0.08 0.10 0.09 0.08 0.10 0.09 0.09	0.21 0.23 0.23 0.25 0.25 0.26 0.26	0.41 0.35 0.45 0.44 0.39 0.39 0.47	9.25 9.80 9.80 9.90 10.35 11.75 10.90	8.00 8.09 8.56 8.64 8.77 10.45 8.80
		Average	0.06	0.09	0.26	0.41	10.25	8.97	2.98
		Lansing	{ G.† P.†	0.68	0.55	1.23	1.85 2.46	1.48 1.82	1.25 3.14
		Detroit	{ G.† P.†	0.28	0.46	1.24	2.00 1.98	1.32	1.50 2.63
		Ann Arbor	{ G.† P.†	.....	.....	.....	17.65	14.00 16.33	.....
		Average	.....	.....	.....	1.65	.....	18.00	8.00
		Richmond	{ G.† P.†	0.09	0.24	0.04	0.41 0.37	8.00 7.94	0.50 0.58
		Ann Arbor	{ G.† P.†	0.40	0.18	0.16	0.82 0.74	8.00 7.22	1.00 1.11
		Average	.....	.....	.....	.....	9.20	7.22	.....
		Average	.....	.....	.....	.....	.....	.....	.....
A 2676	Magic Pulverized Sheep Manure	Lansing	{ G.† P.†	0.68	0.55	1.23	1.85 2.46	1.48 1.82	1.25 3.14
A 3207	Cincinnati Plant Food Co., Cincinnati, Ohio. Nurto Pulverized Sheep Manure	Detroit	{ G.† P.†	0.28	0.46	1.24	2.00 1.98	1.32	1.50 2.63
A 3678*	Columbia Guano Co., Toledo, Ohio. 14% Acid Phosphate	Ann Arbor	{ G.† P.†	.....	.....	.....	17.65	14.00 16.33	.....
A 3274	Bountiful Wheat Guano	Richmond	{ G.† P.†	0.09	0.24	0.04	0.41 0.37	8.00 7.94	0.50 0.58
A 3677*	Extra Dry Guano	Ann Arbor	{ G.† P.†	0.40	0.18	0.16	0.82 0.74	8.00 7.22	1.00 1.11

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A 3301*	Grain Ammoniated Phosphate.....	{ G.† F.†	1.01	0.34	0.24	1.65	15.15	2.32	12.83	16.00
A 3679*	Growco Grain Guano.....	{ G.† F.†	0.42	0.18	0.23	0.83	10.80	2.80	8.00	8.00
	Half and Half Bone and Phosphate.....	G.†				1.43	20.00			2.77
A 3183	High Grade 16% Acid Phosphate.....	{ G.† F.†					18.80	2.52	16.00	
A 3275	High Grade 16% Acid Phosphate.....	{ G.† F.†					18.30	2.33	16.23	
A 3263	High Grade 16% Acid Phosphate.....	{ G.† F.†					18.20	2.00	16.20	
A 3599*	High Grade 16% Acid Phosphate.....	{ G.† F.†					18.45	1.38	17.07	
	Average.....						18.44	2.07	16.37	
A 3273	Jack Tar Potash Mixture.....	{ G.† F.†					11.30	2.01	10.00	2.00
A 3283	Jack Tar Potash Mixture.....	{ G.† F.†					11.28	2.06	9.22	1.99
	Average.....						11.29	2.04	9.23	1.85
Darling & Company, Chicago, Ill.										
A 126*	16% Acid Phosphate.....	{ G.† F.†					18.30	1.96	16.00	
A 2675	16% Acid Phosphate.....	{ G.† F.†					17.28	1.06	16.22	
A 2750	16% Acid Phosphate.....	{ G.† F.†					17.55	1.32	16.23	
A 3063	16% Acid Phosphate.....	{ G.† F.†					17.20	1.00	16.20	
A 3104	16% Acid Phosphate.....	{ G.† F.†					17.40	0.60	16.80	
A 3140	16% Acid Phosphate.....	{ G.† F.†					18.05	1.34	16.71	
A 3461*	16% Acid Phosphate.....	{ G.† F.†					19.38	1.64	17.74	
	Average.....						17.88	1.27	16.61	
A 3047	Big Harvest.....	{ G.† F.†	0.76	0.52	0.38	1.65	16.20	3.52	10.00	2.00
A 3335	Big Harvest.....	{ G.† F.†	0.55	0.67	0.35	1.57	14.40	4.14	12.63	2.83
A 3508*	Big Harvest.....	{ G.† F.†	0.30	0.80	0.58	1.68	15.55	3.44	10.26	2.06
	Average.....		0.54	0.66	0.44	1.64	15.38	3.70	11.63	1.35
A 3438*	Chicago Brand.....	{ G.† F.†	0.45	0.64	0.72	1.65	14.10	4.17	12.00	2.00
A 3316*	Chicago Brand.....	{ G.† F.†	0.52	0.76	0.38	1.66	14.85	3.93	9.93	2.53
A 3692*	Chicago Brand.....	{ G.† F.†	0.74	0.54	0.39	1.67	15.45	3.32	10.92	2.12
	Average.....		0.57	0.64	0.50	1.71	14.80	3.81	10.99	2.15
A 1994	Farmers Favorite.....	{ G.† F.†	0.81	0.53	0.64	2.47	13.70	3.82	8.00	1.00
A 3334	Farmers Favorite.....	{ G.† F.†	0.93	1.40	0.19	2.52	13.70	4.82	9.88	1.44
	Average.....		0.87	1.12	0.41	2.40	13.70	4.32	9.38	1.36

*Abbreviations for Guaranteed and Found.
†Full Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.	
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.	Water Soluble.
A 3383* A 3391*	Darling & Company, Chicago, Ill.—Con. General Crop. General Crop.	Burnips Gallen Average.	0.82 0.71 0.76	0.69 0.47 0.58	0.48 0.37 0.43	1.66 1.99 1.55 1.77	14.70 16.25 15.48	3.14 2.64 2.89	12.00 11.56 13.61 12.59	
A 193* A 2718 A 2664 A 2685 A 3000 A 3107 A 3169*	Gain Grower. Gain Grower. Gain Grower. Ypsilanti. Gain Grower. Gain Grower. Gain Grower. Holland. Zeeland.	Reading. Reading. Ypsilanti. Tecumseh. Clinton. Clinton. Holland. Zeeland.	0.39 0.32 0.26 0.28 0.38 0.49 0.29 0.31	0.25 0.26 0.28 0.26 0.30 0.37 0.30	0.23 0.29 0.38 0.30 0.30 0.18 0.31 0.36	0.82 0.87 0.91 0.94 1.19 1.18 0.88 0.97	12.60 12.10 12.25 12.05 11.85 11.55 12.10	1.96 2.32 2.88 2.23 2.13 2.66 2.56	9.00 10.64 9.78 9.37 9.67 8.89 9.54	1.00 0.64 1.02 1.02 1.05 1.08 0.60
A 2749 A 2987 A 3318*	Half and Half Half and Half Half and Half.	Hudson Tecumseh Charlotte. Average.	0.70 0.77 0.52 0.66	0.31 0.32 0.32 0.32	0.28 0.16 0.27 0.24	0.88 1.29 1.25 1.11 1.22	24.30 24.65 22.85 23.93	10.92 13.65 10.74 11.78	12.00 13.38 10.97 12.15	
A 127* A 3106 A 3108 A 3269 A 3438*	Little Giant. Little Giant. Little Giant. Little Giant. Little Giant.	Dimondale. Nunda. Holland. Richmond. Hudsonville. Average.	0.39 0.46 0.42 0.27 0.45 0.40	0.24 0.35 0.37 0.39 0.25 0.33	0.39 0.31 0.35 0.34 0.34 0.34	0.82 1.02 1.15 1.14 1.00 1.04 1.07	13.40 14.75 11.80 13.00 14.58 13.51	2.18 2.24 1.64 1.90 2.20 1.93	10.00 11.22 12.51 11.60 12.38 11.58	
A 2963 A 3012 A 3168 A 3337	Pulverised Sheep Manure. Pulverised Sheep Manure. Pulverised Sheep Manure. Pulverised Sheep Manure.	Ypsilanti. Kalamazoo. Benion Harbor. Bay City. Average.	0.54 0.50 1.00 0.52 0.64	0.42 0.40 0.33 0.59 0.44	1.01 0.88 0.82 1.01 0.93	2.08 1.97 1.78 2.12 2.01 2.01	3.00 3.20 2.20 3.50 2.90 2.90	0.16 0.64 0.90 0.84 0.56	3.04 1.56 2.10 2.66 2.34 2.34	1.00 2.24 2.06 2.67 2.06

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A 1963	Pure Ground Bone	G.† { F.†	0.81	0.97	0.63	1.88 2.40	28.00 27.15				
A 128* A 1963 A 2659 A 2674 A 2715 A 2900 A 3105 A 3507*	Grand Rapids	{ G.† F.†	0.46	0.37	0.14	0.88	12.45	2.48	10.00	0.50	
	Dimondale	{ G.† F.†	0.17	0.42	0.39	0.97	13.15	2.52	10.63	0.59	
	Sure Winner	{ G.† F.†	0.36	0.32	0.30	0.98	12.10	2.02	10.06	0.54	
	Sure Winner	{ G.† F.†	0.28	0.35	0.31	0.94	12.80	2.34	10.46	0.50	
	Lausling	{ G.† F.†	0.09	0.37	0.42	0.88	13.93	3.08	10.85	0.68	
	Reading	{ G.† F.†	0.20	0.26	0.26	0.84	12.25	2.34	9.91	0.50	
	Clinton	{ G.† F.†	0.25	0.25	0.34	0.84	12.50	2.10	10.40	0.68	
	Nunica	{ G.† F.†	0.49	0.32	0.19	1.00	12.95	2.48	10.47	0.64	
	Grand Rapids	{ G.† F.†	0.30	0.33	0.30	0.93	12.77	2.42	10.35	0.60	
	Average	{ G.† F.†	0.19	0.10	0.50	0.88	16.18	8.89	8.00	0.50	
A 3432	Buchanan	{ G.† F.†	0.22	0.19	0.40	0.88	17.65	4.12	12.00	0.65	
	Blissfield	{ G.† F.†	0.13	0.08	0.31	0.41	17.85	10.07	8.00	1.00	
	Harbor Beach	{ G.† F.†	0.28	0.07	0.20	0.52	17.80	6.18	7.78	1.05	
	Mt. Pleasant	{ G.† F.†	0.11	0.06	0.22	0.55	19.15	8.64	11.62	1.40	
	Mayville	{ G.† F.†	0.17	0.07	0.24	0.39	18.27	8.30	10.51	0.75	
	Average	{ G.† F.†	0.44	0.13	0.28	0.48	14.87	2.29	9.97	1.07	
	Eaton Rapids	{ G.† F.†	0.08	0.18	0.16	0.88	15.15	4.14	11.01	2.56	
	Hudson	{ G.† F.†	0.02	0.17	0.22	0.85	20.23	8.60	9.00	0.50	
	Romeo	{ G.† F.†	0.07	0.26	0.13	0.42	21.93	11.96	11.73	0.54	
	Oxford	{ G.† F.†	0.14	0.17	0.28	0.41	19.10	9.78	9.97	0.46	
A 2666 A 2671 A 2833 A 2871	Harbor Beach	{ G.† F.†	0.08	0.19	0.20	0.46	19.83	10.70	9.32	0.40	
	Wayne	{ G.† F.†	0.08	0.19	0.20	0.59	20.27	10.23	9.13	0.71	
	Average	{ G.† F.†	0.51	0.11	0.31	0.47	17.40	8.58	10.04	0.53	
	Birch Run	{ G.† F.†	0.29	0.07	0.24	0.88	13.75	2.82	8.00	2.00	
	Mason	{ G.† F.†	0.40	0.09	0.28	0.77	17.30	3.23	8.82	1.74	
	Ionia	{ G.† F.†	0.40	0.09	0.28	0.60	15.43	3.05	11.00	3.00	
	Average	{ G.† F.†	0.40	0.09	0.28	0.77	15.43	3.05	13.92	3.27	
	Daybreak Champion Potash Fertilizer	{ G.† F.†	0.40	0.09	0.28	0.77	15.43	3.05	10.47	1.88	
	Daybreak Favorite	{ G.† F.†	0.40	0.09	0.28	0.77	15.43	3.05	12.43	2.56	
	Daybreak Favorite	{ G.† F.†	0.40	0.09	0.28	0.77	15.43	3.05	12.43	2.56	

†Abbreviations for Guaranteed and Found.

*Fall Samples.

FERTILIZER ANALYSES.

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A 3371	Liberty Grain Grower.....	{ G.† F.†	0.13	0.11	0.18	0.41	20.75	10.50	10.00
	Uby.....					0.42		10.25	
A 3257	Liberty Wheat and Corn Grower.....	{ G.† F.†	0.20	0.08	0.23	0.41	18.70	8.00	1.00
A 3308	Liberty Wheat and Corn Grower.....		0.12	0.19	0.34	0.51	20.15	7.36	1.11
	Vassar.....					0.65		11.02	1.22
	Average.....		0.16	0.14	0.28	0.58	19.43	9.19	1.17
A 3247	Michigan Beet and Bean Special.....	{ G.† F.†	0.46	0.06	0.22	0.41	15.70	3.38	11.00
A 3419	Michigan Beet and Bean Special.....		0.30	0.07	0.28	0.74	16.25	12.32	1.15
	Average.....		0.38	0.07	0.25	0.65	15.98	4.44	1.34
A 3372	Nitro Phosphate.....	{ G.† F.†	0.23	0.07	0.15	0.70	15.98	3.91	12.07
	Uby.....					0.41		15.00	
A 134*	Potash Special.....	{ G.† F.†				0.45	18.45	2.48	15.97
A 3105	Potash Special.....								
	Average.....						11.50	1.48	10.00
							21.55	8.78	10.02
									2.15
									1.80
							16.53	5.13	11.40
A 3691*	Royal Phosphate.....	{ G.† F.†					19.50	4.32	14.00
	Minden City.....								15.18
A 3458*	Special Manure.....	{ G.† F.†	0.87	0.13	0.26	0.82	13.88	4.43	10.00
A 3315*	Special Manure.....		0.34	0.16	0.16	1.26	13.70	9.45	2.67
A 3641*	Special Manure.....		0.45	0.11	0.27	0.66	12.55	2.64	1.86
	Average.....		0.55	0.13	0.23	0.83		9.91	1.70
						0.91	13.38	2.97	10.41
A 3222	Special Phosphate Mixture.....	{ G.† F.†							
A 3382	Special Phosphate Mixture.....						24.15	12.28	10.00
A 3420	Special Phosphate Mixture.....						23.55	11.87	
A 3628*	Special Phosphate Mixture.....						24.10	11.12	12.43
A 3689*	Special Phosphate Mixture.....						24.20	11.62	12.48
	Average.....						24.15	10.20	14.00
							24.15	12.50	11.65
							24.03	11.54	12.49
A 3457*	Standard Meal Mixture.....	{ G.† F.†	0.51	0.09	0.06	0.82	25.15	12.26	10.00
	Grand Rapids.....					0.66			12.89

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.		
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.	Water Soluble.
Federal Chemical Co.—Con.											
A 2788	Standard Wheat and Corn Mixture.	Blissfield.	{ G.† F.†	0.10	0.10	0.32	0.41	16.28	3.24	11.50	0.50
A 3086	Standard Wheat and Corn Mixture.	Zeeand.		0.20	0.08	0.21	0.49	15.30	3.52	13.04	0.66
A 3221	Standard Wheat and Corn Mixture.	Dundee.		0.18	0.10	0.20	0.48	15.35	3.46	11.89	0.50
A 3316*	Standard Wheat and Corn Mixture.	Vernontville.		0.13	0.10	0.29	0.52	14.70	2.52	12.18	0.52
	Average			0.15	0.10	0.25	0.50	15.41	3.19	12.22	0.56
A 3690*	Star Phosphate.	Ruth.	{ G.† F.†					15.25	4.00	10.00	
A 3431	Tobacco Formula.	Kalamazoo.	{ G.† F.†	0.07	0.07	0.23	0.41	16.33	8.81	8.00	1.00
A 148*	Wheat and Corn Special.	Mason.	{ G.† F.†	0.15	0.07	0.20	0.41	14.10	2.40	11.00	1.00
A 2667	Wheat and Corn Special.	Rome.		0.24	0.08	0.32	0.53	19.28	7.14	11.70	0.88
A 3531*	Wheat and Corn Special.	Grand Lodge.		0.12	0.07	0.19	0.39	19.65	7.80	11.14	1.08
A 3640*	Wheat and Corn Special.	Clayton.		0.18	0.09	0.29	0.56	14.45	3.14	11.31	1.26
	Average.			0.17	0.08	0.23	0.48	16.87	5.37	11.50	1.11
A 2991	Wheat and Grain Special.	Clinton.	{ G.† F.†	0.44	0.09	0.23	0.82	16.80	3.68	12.00	1.00
A 3456*	Wheat and Grain Special.	Grand Rapids.		0.33	0.11	0.33	0.77	15.08	3.62	11.46	1.65
A 3517*	Wheat and Grain Special.	Nashville.		0.36	0.07	0.39	0.82	15.30	3.14	12.16	0.96
A 3614*	Wheat and Grain Special.	Homer.		0.42	0.11	0.26	0.79	14.80	2.64	12.16	1.48
	Average.			0.39	0.10	0.30	0.79	15.50	3.27	12.23	1.27
A 3670	400 Phosphate Mixture.	Oxford.	{ G.† F.†					24.05	12.92	10.00	
A 2831	400 Phosphate Mixture.	Harbor Beach.						24.60	12.68	11.13	
A 2838	400 Phosphate Mixture.	Minden City.						24.60	13.90	10.70	
	Average.							24.42	13.17	11.26	

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The Fertilizer Chemical Co., Cleveland, Ohio.									
A 2997	Nitro-Fertile.....	{ G.†	2.60	0.00	0.00	2.00	3.95	2.00	2.00
A 3413	Nitro-Fertile.....	{ F.†	2.25	0.00	0.00	2.25	4.30	3.95	3.44
	Average.....		2.43	0.00	0.00	2.43	4.13	4.13	4.79
Lime-Fertile.....									
	G.†					0.00	0.00	0.00	0.00
Gleason Clearing House Association, Detroit, Mich.									
A 3290	14% Acid Phosphate.....	{ G.†					16.95	14.00	
	Ammonia and Phosphoric Acid.....	{ F.†					13.43	13.43	
	G.†					1.65		10.00	
A 3681*	Bean and Corn Grower.....	{ G.†				0.88		10.00	1.00
	Chelsea.....	{ F.†	0.49	0.33	0.23	1.03	11.90	10.10	1.10
A 3326	General Grower.....	{ G.†				0.88		8.00	1.00
	Fairgrove.....	{ F.†	0.42	0.43	0.17	1.02	9.55	8.21	1.28
A 3686*	Grain Grower.....	{ G.†				1.65		8.00	1.00
	Bentley.....	{ F.†	0.89	0.66	0.21	1.76	10.70	8.40	1.27
	Grain Special.....	G.†				1.65		10.00	1.00
A 3289	Phosphoric Acid and Potash.....	{ G.†					12.55	10.00	2.00
A 3291	Phosphoric Acid and Potash.....	{ F.†					11.15	11.55	1.91
A 3328	Phosphoric Acid and Potash.....						10.95	10.31	1.85
A 3680*	Phosphoric Acid and Potash.....						11.40	9.99	2.33
	Average.....						11.51	10.61	1.72
	G.†						0.90	10.61	1.95
A 3324	Wolverine Pride.....	{ G.†	0.47	0.42	0.21	0.88		8.00	2.00
A 3327	Wolverine Pride.....	{ F.†	0.42	0.49	0.30	1.11	10.20	8.84	2.35
	Average.....		0.45	0.46	0.30	1.11	10.35	8.63	2.30
Holland-St. Louis Sugar Co., Decatur, Ind.									
A 3182	Victory Brand Beet and Grain Booster.....	{ G.†				0.80		8.74	2.33
A 3409	Victory Brand Beet and Grain Booster.....	{ F.†	0.86	0.07	0.11	1.04	10.65	10.19	2.49
	Average.....		0.91	0.07	0.07	1.10	11.30	10.92	2.06
	G.†					1.07	10.98	10.56	2.25
	Victory Brand Mint and Onion Booster.....					0.80		10.00	8.00

*Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1910, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Insoluble.	Available.	
A 2922 A 3232	Independent Packers Fertilizer Co., Columbus, O. Independent Truck Special. Independent Truck Special.	Lansing { F. Adrian.	0.38 0.28	0.13 0.15	0.25 0.24	0.82 0.76 0.67	1.98 8.88 1.86	8.00 8.37 7.02	2.00 2.34 3.78
		Average	0.33	0.14	0.25	0.72	9.61	7.86	3.06
		Adrian.	0.26	0.06	0.14	0.41	2.16	10.00	1.00
		Average	0.32	0.25	0.32	0.89	17.40	10.27	1.01
A 2920 A 3465* A 3673*	No. 2 Bone Meal and Phosphate Mixture. No. 2 Bone Meal and Phosphate Mixture. No. 2 Bone Meal and Phosphate Mixture.	Lansing { F. St. Johns Saline	0.45 0.36 0.14	0.36 0.17 0.22	0.26 0.27 0.45	0.82 1.07 0.80 0.81	10.67 7.98 2.74	8.00 7.83 13.36	1.00 1.06 1.03 0.95
		Average	0.32	0.25	0.32	0.89	17.40	10.27	1.01
		Capac { F. North Adams	0.15 0.16	0.08 0.10	0.14 0.29	0.41 0.37 0.56	1.18 2.10 8.55	8.00 8.17 1.25	1.00 0.82 1.25
		Average	0.13	0.09	0.20	0.42	10.89	9.03	0.99
A 3298* A 3350* A 3442* A 3495* A 3617*	No. 4 Independent Grain Special No. 4 Independent Grain Special No. 4 Independent Grain Special No. 4 Independent Grain Special No. 4 Independent Grain Special	Charlotte { F. Grand Lodge St. Johns North Adams Williamston	0.42 0.66 0.34 0.40 0.73	0.14 0.07 0.09 0.08 0.06	0.17 0.15 0.20 0.16 0.12	0.82 0.73 0.90 0.83 0.70 0.91	1.12 0.62 9.15 0.44 0.56 0.80	8.00 7.83 9.35 8.71 8.89 8.56	4.00 4.56 3.65 3.11 3.96
		Average	0.36	0.09	0.16	0.81	9.38	8.67	3.83
		Wayne { F. Lansing Grand Lodge Adrian	0.28 0.52 0.35 0.27	0.15 0.14 0.13 0.15	0.31 0.20 0.25 0.30	0.82 0.74 0.86 0.73	1.16 1.74 2.00 1.86	8.00 9.49 9.11 8.04	1.00 1.06 1.18 1.03
		Average	0.36	0.14	0.26	0.76	10.74	9.03	1.08

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A 2538	No. 5 Universal Crop.	{ G.† F.†	0.41 0.40	0.13 0.11	0.19 0.21	0.73 0.72	12.85 12.65	2.14 1.86	10.00 10.71 10.79
A 3223	No. 5 Universal Crop.								
	Average.		0.41	0.12	0.20	0.73	12.75	2.00	10.76
A 3408	No. 7 Corn & Wheat Special.	{ G.† F.†	0.73 0.34	0.07 0.12	0.18 0.20	0.98 0.96	9.40 8.90	1.38 1.24	8.00 8.02 1.83
A 3540*	No. 7 Corn & Wheat Special.								
A 3609*	No. 7 Corn & Wheat Special.								
A 3618*	No. 7 Corn & Wheat Special.								
A 3653*	No. 7 Corn & Wheat Special.								
	Average.		0.58	0.07	0.16	0.81	9.26	0.97	8.29
A 2788	No. 9 Ammoniated Phosphate.	{ G.† F.†	0.33 0.06	0.13 0.10	0.26 0.22	0.72 0.37	14.65 15.06	2.44 2.36	18.00 12.31 12.69
A 3225	No. 9 Ammoniated Phosphate.								
A 3266	No. 9 Ammoniated Phosphate.								
A 3288	No. 9 Ammoniated Phosphate.								
	Average.		0.11	0.12	0.25	0.48	14.96	2.37	12.69
A 124*	No. 11 High Grade Phosphate.	{ G.† F.†							
A 2319	No. 11 High Grade Phosphate.								
A 2359	No. 11 High Grade Phosphate.								
A 3280	No. 11 High Grade Phosphate.								
A 3304	No. 11 High Grade Phosphate.								
	Average.								
	International Agricultural Corporation, Chicamati, O.								
A 2721	18% Acid Phosphate.	{ G.† F.†							
A 2940	18% Acid Phosphate.								
A 3099	18% Acid Phosphate.								
A 3437*	18% Acid Phosphate.								
	Average.								
A 163*	18% Acid Phosphate.	{ G.† F.†							
A 2720	18% Acid Phosphate.								
A 2949	18% Acid Phosphate.								
A 3016	18% Acid Phosphate.								
A 3081	18% Acid Phosphate.								
A 3460*	18% Acid Phosphate.								
	Average.								

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.	Available.	
International Agricultural Corporation, Cincinnati, O.—Continued.										
A 3004	Farmers Favorite.....	{ F.† }	0.22	0.34	0.24	0.80	11.50	0.82	10.00	.....
A 3148	Farmers Favorite.....		0.36	0.28	0.23	0.87	11.95	1.02	10.93	.....
A 3370	Farmers Favorite.....		0.33	0.27	0.15	0.75	12.10	0.96	11.14	.....
A 3619*	Farmers Favorite.....		0.38	0.27	0.07	0.72	13.06	2.14	10.91	.....
	Average.....		0.32	0.29	0.17	0.78	12.15	1.23	10.92	.....
A 196*	Garbage Tankage & Phosphate.....	{ G.† }	0.05	0.16	0.32	0.40	17.90	3.53	12.60	.....
A 2722	Garbage Tankage & Phosphate.....		0.19	0.13	0.19	0.51	15.70	1.24	14.36	.....
A 3083	Garbage Tankage & Phosphate.....		0.28	0.17	0.04	0.49	13.85	1.10	12.75	.....
A 3377	Garbage Tankage & Phosphate.....		0.18	0.18	0.17	0.53	14.15	0.80	13.35	.....
A 3523	Garbage Tankage & Phosphate.....		0.07	0.15	0.29	0.51	16.75	3.00	13.75	.....
	Average.....		0.15	0.16	0.20	0.51	15.67	1.96	13.71	.....
A 2978	Special Wheat Fertilizer.....	{ G.† }	0.28	0.37	0.28	0.80	22.00	.....	.....	.....
A 2980	Special Wheat Fertilizer.....		0.45	0.37	0.26	1.08	22.18	.....	.....	.....
A 3532*	Special Wheat Fertilizer.....		0.20	0.43	0.31	0.94	22.75	.....	.....	.....
A 3636*	Special Wheat Fertilizer.....		0.17	0.44	0.25	0.86	23.15	.....	.....	.....
A 3637*	Special Wheat Fertilizer.....		0.17	0.36	0.30	0.83	22.70	.....	.....	.....
	Average.....		0.25	0.40	0.28	0.93	22.61	.....	.....	.....
Buffalo Brand.										
A 193*	Ammoniated Phosphate.....	{ G.† }	0.39	0.27	0.29	1.00	16.65	3.46	10.00	.....
A 3369	Ammoniated Phosphate.....		0.62	0.55	0.40	1.57	12.30	0.98	13.19	.....
A 3596*	Ammoniated Phosphate.....		0.63	0.42	0.43	1.37	12.30	0.90	11.40	.....
	Average.....		0.51	0.41	0.37	1.29	13.68	1.75	11.93	.....
A 2096	Buckeye Brand.....	{ G.† }	11.55	0.70	10.00	1.00
A 3265	Buckeye Brand.....		10.80	0.64	10.16	1.30
	Average.....		11.18	0.67	10.51	1.22

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A 2719 Crop Grower.....	Reading.....	0.28	0.27	0.21	0.80	9.78	0.88	8.00	1.00
A 3235 Crop Grower.....	Temperature.....	0.31	0.22	0.26	0.79	11.00	0.90	8.90	1.16
	Average.....	0.30	0.25	0.23	0.78	10.39	0.89	9.50	1.06
A 3095 Dissolved Phosphate.....	Zealand.....					16.40	1.40	14.00	
A 3147 Dissolved Phosphate.....	Byron Center.....					16.35	1.08	15.27	
	Average.....					16.38	1.24	15.14	
A 3584* Grain Grower.....	Zealand.....	0.32	0.21	0.27	0.80	15.10	1.46	15.00	
A 3600* Grain Grower.....	Hart.....	0.31	0.24	0.28	0.73	15.40	1.86	13.54	
	Average.....	0.37	0.22	0.28	0.77	15.25	1.66	13.59	
A 187* Grain and Grass Grower.....	Reading.....	0.37	0.31	0.25	0.80	10.45	2.02	8.00	9.00
A 2718 Grain and Grass Grower.....	Reading.....	0.37	0.25	0.21	0.82	10.25	0.85	9.37	2.15
A 3250* Grain and Grass Grower.....	Townsend.....	0.32	0.20	0.20	1.12	10.40	0.82	10.06	2.60
A 3524* Grain and Grass Grower.....	Charlotte.....	0.46	0.23	0.22	0.91	11.40	2.60	9.40	2.41
	Average.....	0.41	0.27	0.24	0.92	10.80	1.43	9.37	1.96
A 2717 Phosphate & Potash.....	Reading.....								2.26
A 2949 Phosphate & Potash.....	Carlisle.....					13.25	0.84	12.41	9.00
A 3149 Phosphate & Potash.....	Byron Center.....					13.70	0.80	12.55	2.58
A 3439* Phosphate & Potash.....	Hartsville.....					12.95	0.82	12.13	1.68
A 3533* Phosphate & Potash.....	Grand Lodge.....					16.23	1.45	14.77	2.00
	Average.....					15.75	1.86	13.89	2.12
A 185* Two Eight Two.....	Reading.....								2.13
A 3090 Two Eight Two.....	Grand Rapids.....	0.85	0.53	0.28	1.60	11.75	2.46	8.00	9.00
A 3487* Two Eight Two.....	Kalamazoo.....	0.53	0.66	0.44	1.63	8.60	0.60	8.00	2.12
A 3684* Two Eight Two.....	Birch Run.....	0.44	0.78	0.23	1.48	9.25	0.70	8.55	2.03
	Average.....	0.60	0.58	0.32	1.60	10.60	2.04	8.56	1.94
A 162* Acid Phosphate.....	International Agricultural Corporation, Buffalo, New York.....	0.60		0.32	1.59	10.05	1.45	8.60	2.03
A 3483* Acid Phosphate.....	I. A. C. Brands.....								
A 3622* Acid Phosphate.....	Marshall.....					19.25	2.36	16.89	
A 3646* Acid Phosphate.....	Kent City.....					19.25	1.84	17.41	
	Hudson.....					18.05	1.84	16.21	
	Clayton.....					18.35	1.92	16.43	
	Average.....					18.73	1.99	16.74	

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.
I. A. C. Brands.—Continued.									
A 3693*	Alkaline.....	Memphis.....	{ G.† F.† }					10.00 10.86	4.00 3.70
A 3807*	Animal Brand.....	Zealand.....	{ G.† F.† }	1.81	0.51	2.50 2.62	2.40	10.00 9.95	
A 3581*	Complete.....	Kent City.....	{ G.† F.† }	0.88	0.39	1.60		8.00	2.00
A 3623*	Complete.....	Hudson.....	{ G.† F.† }	0.78	0.43	1.65	2.92	8.23	2.02
A 3643*	Complete.....	Clayton.....	{ G.† F.† }	0.82	0.41	1.61	2.48	8.42	2.04
A 3812*	Complete.....	Greenville.....	{ G.† F.† }	0.85	0.38	1.62	3.26	7.89	1.78
		Average.....		0.83	0.40	1.58	9.20	7.07	2.13
A 161*	Corn & Grain.....	Marshall.....	{ G.† F.† }	0.53	0.29	1.20		18.00	
A 3806*	Corn & Grain.....	Zealand.....	{ G.† F.† }	0.52	0.32	0.98	2.76	12.39	
A 3813*	Corn & Grain.....	Greenville.....	{ G.† F.† }	0.59	0.33	0.91	3.38	11.37	
		Average.....		0.55	0.31	1.15	14.30	11.29	
A 160*	Crop Producer.....	Marshall.....	{ G.† F.† }	0.56	0.31	1.01	2.59	11.83	
		Average.....		0.56	0.31	1.00	2.00	11.90	2.00
A 3700*	Early Harvest.....	Utica.....	{ G.† F.† }	0.77	0.45	1.60		10.00	
A 3805*	Early Harvest.....	Zealand.....	{ G.† F.† }	0.80	0.39	1.57	2.96	10.04	
A 3808*	Early Harvest.....	Greenville.....	{ G.† F.† }	0.76	0.40	1.53	2.33	10.23	
		Average.....		0.78	0.41	1.43	2.88	10.57	
		Average.....		0.78	0.41	1.51	2.75	10.28	
A 3810*	General Crop.....	Greenville.....	{ G.† F.† }	0.44	0.30	0.80 0.88	2.40	10.00 10.80	
A 3624*	Steamed Bone.....	Hudson.....	{ G.† F.† }	0.11	0.45	0.80 0.87			
						27.60			

FERTILIZER ANALYSES.

[illegible]

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Insoluble.	Available.	
A 3146	Natural Guano Co., Aurora, Ill. Sheep Head Pulverized Sheep Manure.	Grand Rapids..... { G.† F.†	0.94	0.60	1.23	2.25 2.77	1.85	1.00 1.67	1.50 2.22
						15.00			
A 3210 A 3211 A 3255	Nitrate Agencies Co., Columbus, Ohio. NaCo Nitrate of Soda. Pacific Manure & Fertilizer Co., San Francisco, Calif.	Detroit..... Detroit..... Pontiac..... { G.† F.†	0.43 0.39 0.37	0.43 0.45 0.41	0.97 1.01 0.78	1.50 1.83 1.85 1.56	1.00 1.00 1.00	0.75 0.78 0.82 0.84	2.50 3.03 3.07 2.12
			0.40	0.43	0.92	1.75	1.00	0.81	2.74
A 2834 A 3249 A 3668*	Packers Fertilizer Co., Sandusky, Ohio. Acid Phosphate. Acid Phosphate. Acid Phosphate.	Ruth..... Deerfield..... Deerfield..... { G.† F.†					18.20 16.42 18.40 18.05	1.78 1.78 17.82 17.63	
						Average.....	18.22	0.93	
A 3090 A 3114	Acidulated Phosphate. Acidulated Phosphate.	Zealand..... Holland..... { G.† F.†					17.85 18.95	1.18 2.48	
						Average.....	18.40	1.83	
A 2936 A 3577*	Alkaline Phosphate and Potash. Alkaline Phosphate and Potash.	Willis..... Carson City..... { G.† F.†					13.05 11.55	2.72 0.70	2.00 1.85 3.79
						Average.....	12.30	1.71	2.67
A 3579* A 3669*	Clay Soil Special Clay Soil Special	Carson City..... Deerfield..... { G.† F.†	1.30 1.09	0.17 0.17	0.07 0.08	1.65 1.64	14.55 14.00	0.94 1.96	
			1.20	0.17	0.07	1.44	14.28	1.45	12.83

FERTILIZER ANALYSES.

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A 2757 A 2835 A 3112 A 3667*	Favorite Grain Grower. Favorite Grain Grower. Favorite Grain Grower. Favorite Grain Grower.	{ G. F. }	0.64 0.51 0.57 0.48	0.19 0.15 0.12 0.18	0.18 0.14 0.10 0.17	0.89 1.01 0.80 0.79 0.83	13.15 10.24 13.90 13.95 12.20	2.91 3.62 0.42 1.98	10.00 10.24 10.28 13.53 10.23
	Average.....		0.55	0.16	0.15	0.86	13.30	2.23	11.07	.....
A 2937 A 2957 A 2970 A 3089 A 3113	O. K. Fertilizer. O. K. Fertilizer. O. K. Fertilizer. O. K. Fertilizer. O. K. Fertilizer.	{ G. F. }	0.24 0.27 0.36 0.26 0.29	0.08 0.08 0.06 0.10 0.07	0.13 0.10 0.11 0.08 0.10	0.41 0.45 0.45 0.53 0.44 0.46	14.25 11.91 13.50 11.85 12.65 12.85	2.34 3.42 1.16 1.20 1.94	10.00 0.95 10.08 1.16 1.45 0.96	1.00
	Average.....		0.28	0.08	0.10	0.46	13.02	2.01	11.01	1.00
A 2856 A 3061 A 3141 A 3660*	Phosphate with Humus. Phosphate with Humus. Phosphate with Humus. Phosphate with Humus.	{ G. F. }	0.16 0.27 0.26 0.27	0.09 0.17 0.05 0.08	0.12 0.04 0.10 0.06	0.41 0.37 0.48 0.41	14.60 14.80 15.15 14.70	2.42 1.90 2.34 2.62	12.00 12.18 12.90 12.08	.....
	Average.....		0.24	0.10	0.08	0.42	14.81	2.32	12.49	.....
A 3187 A 3190	Potato Tobacco and Truck Grower. Potato Tobacco and Truck Grower.	{ G. F. }	0.52 0.51	0.11 0.11	0.20 0.18	0.82 0.83 0.80	10.20 10.65	1.02 1.12	8.00 9.18 9.53	2.00 1.79 1.85
	Average.....		0.52	0.11	0.19	0.82	10.43	1.07	9.36	1.82
A 2969 A 3494*	Pure Bone with Phosphate. Pure Bone with Phosphate.	{ G. F. }	0.53 0.63	0.12 0.14	0.15 0.13	0.82 0.80 0.90	17.00 17.20	8.90 8.92	8.00 8.10 8.28	1.00 1.22 0.94
	Average.....		0.58	0.13	0.14	0.85	17.10	8.91	8.19	1.03
A 3541* A 3671*	Quality Brand. Quality Brand.	{ G. F. }	1.37 1.45	0.14 0.10	0.10 0.08	1.65 1.61 1.60	14.40 12.33	0.66 1.83	12.00 13.74 10.50	2.00 1.98 1.98
	Average.....		1.41	0.12	0.08	1.61	13.37	1.25	12.12	1.94
A 3578* A 3672*	Superphosphate and Potash. Superphosphate and Potash.	{ G. F. }	..... .....	..... .....	..... .....	..... .....	11.55 10.45	0.54 0.50	10.00 9.95	4.00 3.08 3.95
	Average.....		.....	.....	.....	.....	11.00	0.52	10.48	3.48

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919. EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Insoluble.	Available.	Water Soluble.
A 2758 A 3189 A 3493 A 3540	Packers Fertilizer Co.—Con.	Hudson	{ G.† F.†	0.45 0.16	0.16	0.82	13.40	11.00	1.00
		Lake Odessa	{ G.† F.†	0.43 0.19	0.20	0.77	14.00	12.12	1.16
		Holland	{ G.† F.†	0.51 0.16	0.21	0.73	13.85	12.28	1.13
		Lake Odessa	{ G.† F.†	0.50 0.18	0.23	0.88	13.88	11.08	0.98
		Average	{ G.† F.†	0.47 0.16	0.20	0.83	13.80	11.62	1.09
A 3075	Parke Davis & Co., Detroit, Mich.	Parkdale Fertilizer	{ G.† F.†	0.30	0.33	0.80	0.90	0.40	1.50
		Pulverized Manure Co., Chicago, Illinois.	{ G.† F.†	0.30	0.33	1.56	0.90	0.72	1.95
		Wizard Brand Cattle Manure	{ G.† F.†	0.30	0.46	1.73	1.55	1.21	1.49
		Wizard Brand Mixed Manure	{ G.† F.†	0.21 0.30	0.40 0.53	1.80	1.75	1.00	1.00
		Wizard Brand Sheep Manure	{ G.† F.†	0.26	0.47	1.77	1.53	1.05	2.25
A 3074	Queen City Fertilizer Co., Sandusky, Ohio.	Wizard Brand Sheep Manure	{ G.† F.†	0.48	0.19	0.88	10.05	8.00	1.00
		Wizard Brand Sheep Manure	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Average	{ G.† F.†	0.48	0.19	0.88	10.05	8.91	0.98
		Alma	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Average	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
A 3131	F. S. Royster Guano Co., Toledo, Ohio.	Special Sugar Beet Grower	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		14% Acid Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		14% Acid Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		14% Acid Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		14% Acid Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
A 3462 A 3467	Alrite Ammoniated Phosphate	Alrite Ammoniated Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Alrite Ammoniated Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Alrite Ammoniated Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Alrite Ammoniated Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98
		Alrite Ammoniated Phosphate	{ G.† F.†	0.48	0.19	0.79	10.05	8.91	0.98

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A 3021	Black Soil Guano.....	{ G.†	0.38	0.30	0.21	0.79	10.15	3.07	8.00	5.00
A 3032	Black Soil Guano.....	{ F.†	0.35	0.19	0.23	0.77	10.55	2.91	7.05	4.44
A 3203	Black Soil Guano.....		0.45	0.19	0.19	0.83	9.80	1.46	8.54	5.06
A 3453*	Black Soil Guano.....		0.37	0.18	0.17	0.72	11.85	4.00	7.56	4.62
A 3509*	Black Soil Guano.....		0.35	0.18	0.27	0.80	11.75	2.72	9.08	4.12
	Average.....		0.38	0.19	0.21	0.78	10.82	2.83	7.99	4.41
A 175*	Cloverdale Potash Mixture.....	{ G.†							10.00	2.00
A 2399	Cloverdale Potash Mixture.....	{ F.†							10.93	1.96
A 2835	Cloverdale Potash Mixture.....						11.55	0.62	10.93	1.96
A 2940	Cloverdale Potash Mixture.....						11.55	1.96	9.89	1.67
A 3074	Cloverdale Potash Mixture.....						11.53	2.31	9.22	1.67
A 3238	Cloverdale Potash Mixture.....						12.25	1.99	10.26	1.77
A 3477*	Cloverdale Potash Mixture.....						11.38	2.06	9.32	1.77
A 3670*	Cloverdale Potash Mixture.....						12.16	2.02	10.13	1.78
	Average.....						11.80	2.32	8.89	1.78
							12.10	2.03	10.08	1.71
A 174*	Cuckoo Crop Guano.....	{ G.†							9.83	1.77
A 2325	Cuckoo Crop Guano.....	{ F.†							8.00	1.00
A 2847	Cuckoo Crop Guano.....		0.53	0.18	0.02	0.89	8.05	0.02	8.00	0.94
A 2944	Cuckoo Crop Guano.....		0.29	0.21	0.23	0.72	9.33	1.84	7.64	0.93
A 3204	Cuckoo Crop Guano.....		0.27	0.21	0.25	0.79	9.78	1.86	7.77	0.93
A 3410	Cuckoo Crop Guano.....		0.52	0.19	0.16	0.87	8.58	2.06	7.71	0.91
A 3459*	Cuckoo Crop Guano.....		0.32	0.17	0.26	0.75	9.18	1.63	7.84	0.97
A 3459*	Cuckoo Crop Guano.....		0.32	0.16	0.19	0.81	9.45	1.49	7.99	1.19
A 3459*	Cuckoo Crop Guano.....		0.54	0.18	0.11	0.81	9.78	2.47	7.81	1.18
A 3638*	Cuckoo Crop Guano.....		0.53	0.17	0.08	0.83	9.43	2.38	7.69	0.97
A 3650*	Cuckoo Crop Guano.....		0.52	0.12	0.10	0.74	8.98	0.78	7.08	1.08
	Average.....		0.41	0.18	0.17	0.76	9.32	1.67	7.88	0.97
A 2785	Deposito Grain Guano.....	{ G.†							13.00	0.50
A 2948	Deposito Grain Guano.....	{ F.†	0.69	0.13	0.18	0.41	15.65	2.52	13.13	0.44
A 3068	Deposito Grain Guano.....		0.08	0.12	0.22	1.00	14.90	2.49	12.41	0.55
A 3116	Deposito Grain Guano.....		0.17	0.13	0.15	0.45	15.65	2.54	13.11	0.48
A 3288	Deposito Grain Guano.....		0.08	0.11	0.21	0.40	15.80	2.64	13.16	0.55
A 3298	Deposito Grain Guano.....		0.10	0.11	0.17	0.38	13.45	2.28	11.17	0.42
A 3650*	Deposito Grain Guano.....		0.07	0.10	0.15	0.32	14.53	2.43	12.10	0.20
	Average.....		0.17	0.15	0.12	0.44	14.55	1.70	12.55	0.53
A 3590*	Fifty Fifty Bone & Phosphate.....	{ G.†	0.20	0.13	0.17	0.49	14.93	2.37	12.56	0.48
	Kent City.....	{ F.†	0.43	0.48	0.33	1.23	20.00	8.98	13.02	.....

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.	Available.	
A 191* A 2933 A 2967 A 3022 A 3117 A 3310*	F. S. Royster Guano Co., Toledo, Ohio.—Con.	Jonesville. { F.†	0.97	0.24	0.32	1.66	11.10	1.44	8.00	3.00
		Willis.	0.96	0.18	0.24	1.53	9.03	2.84	9.66	3.03
		Ypsilanti.	0.88	0.17	0.32	1.39	9.03	2.84	6.79	2.71
		Kalamazoo.	1.05	0.20	0.31	1.32	9.90	2.45	7.45	2.44
		Sawyer.	0.92	0.17	0.20	1.46	9.25	2.41	6.84	2.75
		Decatur.	0.97	0.17	0.20	1.29	9.35	1.98	7.39	2.70
		Average.	0.96	0.19	0.24	1.34	9.40	1.28	8.12	1.98
A 2937 A 2947 A 3176 A 3428	Flamingo Ammoniated Phosphate. Flamingo Ammoniated Phosphate. Flamingo Ammoniated Phosphate. Flamingo Ammoniated Phosphate.	Minden City. { F.†	1.35	0.48	0.33	2.06	14.13	2.52	12.00	
		Plymouth.	1.45	0.36	0.30	2.11	15.40	2.50	12.90	
		Sawyer.	1.50	0.36	0.23	2.09	13.80	2.32	11.48	
		Kalamazoo.	1.46	0.43	0.30	2.19	13.90	2.40	11.50	
A 2768 A 3202 A 3639*	Ground Bone Meal. Ground Bone Meal. Ground Bone Meal.	Average.	1.44	0.41	0.29	2.14	14.31	2.44	11.87	
		Adrian. { F.†	0.38	0.99	0.26	0.82	49.00			
		Ann Arbor.	0.55	1.22	0.31	1.53	29.80			
		Clayton.	0.31	0.92	0.33	2.56	26.19			
		Average.	0.51	1.04	0.37	1.92	27.71			
A 1987 A 2946 A 2976 A 3116 A 3249 A 3267	Half and Half Wheat Guano. Half and Half Wheat Guano. Half and Half Wheat Guano. Half and Half Wheat Guano. Half and Half Wheat Guano. Half and Half Wheat Guano.	Coopersville. { F.†	0.03	0.15	0.23	0.41	9.20	1.32	8.00	0.50
		Wayne.	0.06	0.14	0.23	0.41	9.40	1.70	7.88	0.48
		Wayne.	0.06	0.14	0.20	0.37	8.40	1.70	8.10	0.54
		Holland.	0.07	0.13	0.19	0.42	10.40	2.04	8.36	0.49
		Fairbairns.	0.01	0.19	0.22	0.39	9.90	1.84	8.06	0.45
		Armada.	0.04	0.17	0.25	0.42	9.23	1.69	7.54	0.52
		Average.	0.04	0.15	0.22	0.46	10.05	1.82	8.23	0.47
A 178* A 192* A 192* A 2958	Harmony Potash Mixture. Harmony Potash Mixture. Harmony Potash Mixture. Harmony Potash Mixture.	Average.	0.04	0.15	0.22	0.41	9.76	1.73	8.03	0.49
		Jonesville. { F.†					14.00	1.00	12.00	2.00
		Reading.					13.45	1.04	11.91	1.90
		Beck.					13.88	2.21	11.37	2.32

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A 2946 A 3545*	Harmony Potash Mixture Harmony Potash Mixture	Ypsilanti. Conklin.					14.13 14.30	2.09 2.04	12.04 12.26	1.99 1.96
	Average						13.89	1.77	12.12	1.93
A 1888 A 2000 A 2698 A 2837 A 2836 A 2839 A 3489	High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate. High Grade 16% Acid Phosphate.	Coopersville. Portage. Quincy. Bad Axe. Minden City. Beech. Holland.	{ G. F. }				18.43 17.93 18.20 18.08 18.85 19.10 17.50	2.04 3.01 2.50 2.60 2.80 2.18 0.32	16.00 16.39 14.92 15.70 15.49 16.05 16.92 17.18	
	Average						18.30	2.21	16.09	
A 2732 A 2796 A 3548* A 3551*	Meteor Ammoniated Phosphate. Meteor Ammoniated Phosphate. Meteor Ammoniated Phosphate. Meteor Ammoniated Phosphate.	Hillsdale. Blissfield. Conklin. Morenci.	{ G. F. }	0.34 0.48 0.52 0.38	0.25 0.31 0.33 0.23	0.21 0.25 0.23 0.13	0.82 0.90 1.04 0.79	1.92 2.88 2.27 2.16	12.48 11.87 11.98 11.74	
	Average			0.43	0.26	0.22	0.93	2.31	12.02	
A 2898 A 2945 A 3023 A 3304 A 3306 A 3544*	Old Glory Potash Mixture. Old Glory Potash Mixture. Old Glory Potash Mixture. Old Glory Potash Mixture. Old Glory Potash Mixture. Old Glory Potash Mixture.	Flat Rock. Milan. Portage. Lapeer. Irmy City. Conklin.	{ G. F. }				10.50 10.93 11.60 11.95 12.47 11.70	1.18 1.23 1.58 2.02 1.74 1.44	10.00 9.32 9.70 10.02 9.83 10.26	1.00 0.87 0.83 0.95 0.92 1.00 1.19
	Average						11.51	1.53	9.98	0.96
A 2846 A 3078 A 3117 A 3429	Penguin Ammoniated Phosphate. Penguin Ammoniated Phosphate. Penguin Ammoniated Phosphate. Penguin Ammoniated Phosphate.	Plymouth. Grand Rapids. Holland. Kalamazoo.	{ G. F. }	1.04 1.13 0.19 1.02	0.26 0.26 0.00 0.35	0.20 0.20 0.00 0.13	1.66 1.50 1.59 1.50	1.81 2.00 1.86 2.23	10.00 9.89 9.83 9.90	
	Average			0.85	0.22	0.13	1.20	1.97	9.71	

†Abbreviations for Guaranteed and Found.

*Fall Samples.

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A 3573*	Wonder Worker Guano.....	Middletown.....	0.53	0.16	0.11	0.80	10.95	3.27	7.68	2.77
A 3647*	Wonder Worker Guano.....	Cedrus.....	0.31	0.20	0.28	0.79	10.15	1.72	8.43	2.68
		Average.....	0.57	0.18	0.23	0.98	10.04	1.94	8.10	2.45
A 2787	Yankee Potash Mixture.....	Blissfield.....	{ G. P. }						18.00	1.00
A 3387	Yankee Potash Mixture.....	Washington.....					14.73	1.76	12.97	0.95
A 3545*	Yankee Potash Mixture.....	Conklin.....					13.25	0.54	12.71	0.82
		Average.....					13.43	1.44	11.99	1.17
	Smith Agricultural Chemical Co., Columbus, Ohio.									
A 2725	16% Acid Phosphate.....	Reading.....	{ G. P. }						16.00	
A 2823	16% Acid Phosphate.....	Bad Axe.....					17.85	1.48	16.37	
A 2869	16% Acid Phosphate.....	Wayne.....					18.15	1.82	16.33	
A 2889	16% Acid Phosphate.....	Wala.....					17.75	1.32	16.43	
A 3475*	16% Acid Phosphate.....	Nunica.....					17.95	1.06	15.99	
		Average.....					18.40	1.34	17.06	
A 2775	Ammoniated Phosphate and Potash.....	Palmyra.....	{ G. P. }			0.41	18.02	1.58	16.44	
A 2824	Ammoniated Phosphate and Potash.....	Bad Axe.....			0.53	0.41	10.10	1.30	7.00	1.00
A 3101	Ammoniated Phosphate and Potash.....	Nunica.....			0.37	0.37	8.08	1.26	8.80	1.05
A 3284	Ammoniated Phosphate and Potash.....	Berville.....			0.19	0.38	10.40	1.28	6.82	1.16
		Average.....			0.17	0.35	8.50	1.22	9.12	1.03
A 3471*	Climax Phosphate.....	Fillmore.....	0.08	0.11	0.22	0.41	9.27	1.26	8.01	1.06
A 2890	General Crop.....	Wala.....							10.00	4.00
		Average.....							12.11	4.00
A 198*	Potash Formula.....	Reading.....	{ G. P. }			0.84	12.55	1.60	10.00	
A 2773	Potash Formula.....	Palmyra.....			0.75	0.75	10.95		10.95	
A 3102	Potash Formula.....	Nunica.....							7.00	2.00
A 3336	Potash Formula.....	Bay City.....			0.17	0.40	8.90	1.06	9.59	2.01
A 3474	Potash Formula.....	Nunica.....			0.20	0.41	8.50	1.30	7.60	2.14
		Average.....			0.22	0.45	10.65	1.30	7.20	2.21
A 2826	Soluble Phosphate and Potash.....	Bad Axe.....					9.60	1.04	9.35	1.59
A 3475*	Soluble Phosphate and Potash.....	Nunica.....							8.56	1.79
		Average.....							8.45	1.95
									10.00	2.00
									10.29	1.96
									11.18	2.04
		Average.....							10.74	2.00

Abbreviations for Guaranteed and Found.
* Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.		Potash.		
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Total.	Insoluble.		Available.	
A 197* A 2774 A 2848 A 3108	Smith Agricultural Chemical Co.—Con. Wheat Maker and Seeding Down. Wheat Maker and Seeding Down. Wheat Maker and Seeding Down. Wheat Maker and Seeding Down.	Reading. { F.†	0.16 0.61	0.13 0.11	0.19 0.32	0.41 0.48	15.30 15.10	1.58 1.22	12.00 13.72	Water Soluble.	
		Palmyra. Wayne. Nunica.	0.10 0.09	0.10 0.09	0.28 0.22	0.48 0.40	14.80 15.10	1.56 1.40	13.88 13.24		
		Average.	0.09	0.11	0.25	0.45	15.08	1.44	13.64		
		Benton Harbor. { F.†	0.09	0.32	0.69	1.53 1.10	0.001				0.002
		Detroit.									60.53 55.21
A 3209 A 3072 A 3169	U. S. Potash. L. Speidel, St. Joseph, Mich. Fish Tankage. Fish Tankage.										
		St. Joseph. St. Joseph. { F.†	1.50 1.17	2.76 3.19	3.08 2.82	7.43 7.34 7.18	7.30 9.05	2.32 3.12	4.01 5.93		
		Average.	1.34	2.97	2.95	7.26	8.18	2.72	5.46		
		Bad Axe. Bellefonte. Ida. { F.†									16.00 16.31 17.17 16.91
		Average.					17.55	0.75	16.80		
A 2829 A 2878 A 3665* A 2776 A 2828 A 2927 A 2961 A 3663*	J. L. & H. Stadler Rendering & Fertilizer Co., Cleveland, Ohio. 16% Acid Phosphate. 16% Acid Phosphate. 16% Acid Phosphate. Ammoniated Acid Phosphate. Ammoniated Acid Phosphate. Ammoniated Acid Phosphate. Ammoniated Acid Phosphate.										
		Bad Axe. Bellefonte. Ida. { F.†									16.00 16.31 17.17 16.91
		Average.					17.55	0.75	16.80		
		Jasper. Bad Axe. Milan. Maybee. Ida. { F.†	0.43 0.34 0.69 0.47 0.50	0.16 0.19 0.17 0.16 0.17	0.25 0.30 0.21 0.23 0.27	0.80 0.84 0.83 0.86 0.94	12.75 12.50 13.15 12.75 12.10	1.08 1.56 1.36 1.34	10.00 10.94 11.39 10.86		
		Average.	0.49	0.17	0.25	0.91	12.65	1.52	11.13		

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A 3558*	Bone and Acid Phosphate.....	{ G.† F.†	0.60	0.72	0.47	1.40	18.00	11.72	8.86
A 3394	General Crop Grower.....	{ G.† F.†	1.04	0.28	0.56	1.88	12.95	2.20	10.00	1.00
	Grain Grower.....	G.†	.....	.....	.....	1.60	.....	.....	10.00	.....
A 2701	Harvest King.....	{ G.† F.†	0.46	0.16	0.25	0.80	11.06	1.22	9.00	1.00
A 2762	Harvest King.....	{ G.† F.†	0.37	0.18	0.31	0.86	11.65	1.46	9.83	0.93
A 2783	Harvest King.....	{ G.† F.†	0.43	0.19	0.29	0.91	11.40	1.44	10.19	1.12
A 3602*	Harvest King.....	{ G.† F.†	0.39	0.12	0.28	0.79	11.10	0.94	9.96	1.03
	Average.....		0.42	0.16	0.28	0.86	11.30	1.27	10.03	1.07
A 3642*	Pure Bone Meal.....	{ G.† F.†	1.24	0.98	0.70	2.80	20.00	.....	.....	.....
	Special Bone Meal.....	G.†	.....	.....	.....	1.60	25.00	.....	.....	.....
A 3452*	Valley Phosphate.....	{ G.† F.†	1.36	0.30	0.60	2.05	11.50	1.08	9.83	1.60
A 2830	Vegetable and Grain Grower.....	{ G.† F.†	0.51	0.18	0.26	0.80	12.75	2.26	10.00	0.60
A 2959	Vegetable and Grain Grower.....	{ G.† F.†	0.62	0.16	0.23	1.01	13.60	1.54	12.06	0.64
A 3664*	Vegetable and Grain Grower.....	{ G.† F.†	0.56	0.15	0.23	0.94	13.05	2.00	11.05	0.59
	Average.....		0.56	0.16	0.24	0.96	13.13	1.93	11.20	0.57
A 2737	Vegetable Manure.....	{ G.† F.†	0.40	0.44	0.33	1.80	14.90	2.12	12.76	.....
A 2960	Vegetable Manure.....	{ G.† F.†	0.74	0.26	0.36	1.36	15.05	2.18	12.87	.....
A 3903*	Vegetable Manure.....	{ G.† F.†	0.64	0.19	0.27	1.10	14.65	1.22	13.43	.....
	Average.....		0.59	0.30	0.32	1.21	14.87	1.84	13.03	.....
A 1986	Nicholas Swartz, Grand Haven, Mich. Celery Hustler.....	{ G.† F.†	1.30	5.91	2.51	7.88	3.81	0.66	3.89	.....
	Swift & Company, Chicago, Ill.		.....	.....	.....	.....	.....	.....	.....	.....
A 2884	Bean and Grain Grower 1-8-3.....	{ G.† F.†	0.11	0.19	0.43	0.82	9.75	1.34	8.00	5.00
A 3014	Bean and Grain Grower 1-8-3.....	{ G.† F.†	0.46	0.24	0.21	0.73	10.63	1.20	8.51	3.11
A 3061	Bean and Grain Grower 1-8-3.....	{ G.† F.†	0.46	0.21	0.25	0.91	10.20	1.36	9.43	2.84
A 3500*	Bean and Grain Grower 1-8-3.....	{ G.† F.†	0.86	0.16	0.18	1.00	12.95	2.12	10.86	2.24
A 3608*	Bean and Grain Grower 1-8-3.....	{ G.† F.†	0.46	0.07	0.17	0.70	13.98	0.96	8.89	1.24
	Average.....		0.43	0.17	0.25	0.85	10.68	1.38	9.30	2.25

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1910, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled as	Nitrogen.			Phosphoric Acid.		Potash.	
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total.	Phosphoric Acid.		
							Insoluble.		Available.
Swift & Company, Chicago, Ill.—Continued.									
A 2922	Bean and Sugar Beet Grower 1-12-1	Traverse City	0.40	0.27	0.28	0.89	18.00	1.00	
A 2993	Bean and Sugar Beet Grower 1-12-1	Chelsea	0.26	0.23	0.19	0.68	13.30	1.15	
A 3052	Bean and Sugar Beet Grower 1-12-1	Janetown.	0.49	0.20	0.19	0.88	15.06	1.03	
A 3130	Bean and Sugar Beet Grower 1-12-1	Alma	0.86	0.20	0.15	0.73	13.30	1.06	
	Average		0.40	0.23	0.20	0.83	13.76	1.06	
A 141*	Champion Wheat and Corn Grower 2-12-2	Albion	1.21	0.16	0.18	1.65	15.30	1.94	
A 173*	Champion Wheat and Corn Grower 2-12-2	Coldwater	1.29	0.19	0.13	1.61	14.25	1.94	
A 2814	Champion Wheat and Corn Grower 2-12-2	Elm	0.92	0.16	0.47	1.60	13.85	2.55	
A 3408*	Champion Wheat and Corn Grower 2-12-2	Zeland	1.08	0.19	0.13	1.41	14.45	1.82	
A 3514*	Champion Wheat and Corn Grower 2-12-2	Dutton	1.19	0.24	0.10	1.53	14.10	2.18	
A 3535*	Champion Wheat and Corn Grower 2-12-2	Mulliken	1.25	0.13	0.22	1.60	14.25	2.54	
	Average		1.06	0.20	0.20	1.55	14.37	2.06	
A 2981	Clay Soil Special 2-12-0	Lansing	0.90	0.31	0.45	1.66	13.50	1.94	
A 2984	Clay Soil Special 2-12-0	Coldwater	0.79	0.34	0.43	1.56	13.58	1.94	
A 3153	Clay Soil Special 2-12-0	Bauger	0.79	0.37	0.30	1.46	14.30	1.94	
	Average		0.83	0.34	0.39	1.56	13.76	1.94	
A 150*	Complete Fertilizer 1-8-1	Mason	0.36	0.10	0.34	0.80	9.05	1.00	
A 2960	Complete Fertilizer 1-8-1	Deverson	0.28	0.19	0.20	0.67	9.93	1.28	
A 2920	Complete Fertilizer 1-8-1	Traverse City	0.41	0.23	0.23	0.86	9.75	0.94	
A 2856	Complete Fertilizer 1-8-1	Elm	0.26	0.25	0.26	0.77	11.60	0.94	
A 2985	Complete Fertilizer 1-8-1	New Boston	0.57	0.14	0.24	0.95	9.25	0.94	
A 2902	Complete Fertilizer 1-8-1	Pist Rock	0.37	0.30	0.36	0.83	10.05	0.99	
A 3553*	Complete Fertilizer 1-8-1	Sarnau	0.51	0.15	0.31	0.97	10.30	0.99	
	Average		0.37	0.19	0.25	0.81	9.98	1.06	
A 159*	Diamond K Grain Grower 1-12-1	Mason	0.64	0.15	0.05	0.89	14.30	1.00	
A 2723	Diamond K Grain Grower 1-12-1	Reading	0.40	0.23	0.34	0.86	14.55	1.13	

FERTILIZER ANALYSES.

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A 2800	Diamond K Grain Grower 1-12-1.	0.54	0.21	0.18	0.93	13.55	0.84	12.71	0.96
A 2923	Diamond K Grain Grower 1-12-1.	0.63	0.23	0.19	1.04	13.90	1.00	12.90	1.12
A 3498*	Diamond K Grain Grower 1-12-1.	0.67	0.23	0.06	0.95	14.85	2.06	12.70	0.91
	Average.....	0.58	0.20	0.14	0.92	14.23	1.34	12.89	1.07
A 3331	Diamond S Phosphate 10%.....	{G.†						10.00	
A 3688*	Diamond S Phosphate 10%.....	{F.†						10.28	
	Average.....					11.60	1.32	11.43	
A 2680	Garden City Phosphate 14%.....	{G.†				12.00	1.12	10.88	
A 2806	Garden City Phosphate 14%.....	{F.†						14.00	
A 2947	Garden City Phosphate 14%.....					15.93	1.76	14.17	
	Average.....					17.40	1.60	15.80	
A 164*	High Grade Acid Phosphate 16%.....					17.60	1.06	16.54	
A 2686	High Grade Acid Phosphate 16%.....					16.98	1.47	15.51	
A 2696	High Grade Acid Phosphate 16%.....							16.00	
A 2806	High Grade Acid Phosphate 16%.....					18.65	0.44	18.41	
A 3060	High Grade Acid Phosphate 16%.....					17.55	1.42	16.43	
	Average.....					18.13	2.24	15.89	
						18.60	1.10	17.50	
						18.35	1.36	16.99	
						18.35	1.31	17.04	
A 3499*	Muck Soil Fertilizer.....	{G.†						12.00	\$ 0.00
A 3539*	Muck Soil Fertilizer.....	{F.†						12.00	1.06
A 3575*	Muck Soil Fertilizer.....		0.57	0.13	0.82	14.90	2.22	12.93	2.99
A 3682*	Muck Soil Fertilizer.....		0.61	0.07	0.86	15.30	2.76	12.51	2.76
			0.51	0.13	0.74	14.23	2.06	12.78	2.76
			0.70	0.08	0.94	14.83	2.03	12.80	2.29
			0.61	0.06	0.85	14.83	2.03	12.80	2.29
A 3018	Pulverized Sheep Manure 2-1-1.....	{G.†				1.00	0.88	2.32	1.50
A 3249	Pulverized Sheep Manure 2-1-1.....	{F.†				3.20	0.18	0.97	2.46
A 3314	Pulverized Sheep Manure 2-1-1.....		0.25	0.10	1.20	2.28	0.13	1.52	2.23
			0.38	0.11	1.07	2.00	0.48	1.52	2.23
			0.19	0.52	1.14	2.02	0.51	1.60	2.32
			0.27	0.61	1.14	2.11	0.51	1.60	2.32
A 2635	Special Superphosphate 2-8-1.....	{G.†						8.00	1.00
A 2638	Special Superphosphate 2-8-1.....	{F.†						7.43	1.00
A 2921	Special Superphosphate 2-8-1.....		0.34	0.60	0.55	10.13	3.70	8.49	1.83
			0.14	0.72	0.80	11.75	3.28	8.93	1.18
			0.46	0.76	0.56	10.28	3.35	8.93	1.18
			0.31	0.69	0.64	10.72	3.10	7.62	1.17

†Abbreviations for Guaranteed and Found.
*Fall Samples.

FERTILIZER ANALYSES.

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A 3119 A 3317	1-10-0 Fertilizer. 1-10-0 Fertilizer.	Charlotte, Clio.	{ G.† F.†	0.49 0.42	0.18 0.15	0.21 0.23	0.82 0.88 0.80	12.75 12.75 11.80	1.40 1.40 0.92	10.00 10.88 10.88
	Average			0.46	0.16	0.22	0.84	12.28	1.16	11.12
A 3201	1½-20 Bone Meal.	Ann Arbor	{ G.† F.†	0.59	0.90	0.45	1.43 1.94	20.00 21.80		
A 2738 A 2800 A 3042 A 3462*	2½-20 Bone Meal. 2½-20 Bone Meal. 2½-20 Bone Meal. 2½-20 Bone Meal.	Albion North Adams Hudsonville Jamestown	{ G.† F.† F.† F.†	0.57 0.45 1.39 0.39	1.14 1.28 1.39 0.82	0.62 0.42 0.51 0.64	1.86 2.33 2.15 2.89 1.85	29.00 28.75 28.88 29.60 31.10		
	Average			0.47	1.16	0.55	2.18	29.58		
A 3699*	10-4 Fertilizer.	Memphis	{ G.† F.†					11.80	1.36	10.00 10.44
A 132* A 3493*	12-2 Fertilizer. 12-2 Fertilizer.	Mason Zeeland	{ G.† F.†					13.75 12.70	0.90 0.80	12.00 12.85 11.90
	Average							13.23	0.85	12.38
A 3685* A 3687* A 3694*	1½-12-1½ Fertilizer. 1½-12-1½ Fertilizer. 1½-12-1½ Fertilizer.	Munger Unionville Dryden	{ G.† F.† F.†	0.88 0.90 0.97	0.10 0.10 0.10	0.19 0.17 0.14	1.45 1.17 1.21	13.50 13.05 13.95	2.32 2.78 2.60	18.00 13.18 12.37 12.35
	Average			0.91	0.10	0.17	1.18	15.17	2.57	12.60
A 3554* A 3584* A 3595* A 3695*	2-10-4 Fertilizer. 2-10-4 Fertilizer. 2-10-4 Fertilizer. 2-10-4 Fertilizer.	Sarasac Chenaca Perrville Coruna	{ G.† F.† F.† F.†	1.00 0.71 1.06 1.31	0.19 0.10 0.12 0.18	0.26 0.11 0.09 0.02	1.65 1.48 0.92 1.27 1.51	13.05 11.95 12.35 11.33	2.40 1.34 1.08 1.22	10.00 10.65 10.61 11.19 10.06
	Average			1.02	0.15	0.13	1.30	12.13	1.50	10.63
	Virginia-Carolina Chemical Co., Cincinnati, O.									3.91
A 1982 A 2793 A 2953 A 2981 A 3100 A 3472*	V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate.	Coopersville Erie Carleton Leaswe Junction Nunica Nunica	{ G.† F.† F.† F.† F.† F.†					18.60 19.60 19.85 18.80 19.40 18.40	1.44 0.88 0.76 1.24 0.70 0.34	16.00 17.16 18.72 19.09 17.56 18.70 18.06
	Average							19.11	0.89	18.22

† Abbreviations for Guaranteed and Found.

*† All Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.			Phosphoric Acid.			Potash.
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Insoluble.	Available.	
A 3157 A 3370* A 3653*	Swift & Company, Chicago, Ill.—Con. Superphosphate 2-8-2. Superphosphate 2-8-2. Superphosphate 2-8-2.	Bangor..... { G.† F.†	0.26 0.41 1.11	0.61 0.77 0.13	0.46 0.44 0.15	1.65 1.33 1.39	10.13 10.70 9.30	8.00 7.62 7.90 8.04	2.00 1.56 1.86 1.93
		Average.....	0.59	0.51	0.35	1.45	10.04	7.85	1.79
		Coldwater..... { G.† F.†	0.59 0.30 0.33	0.21 0.35 0.25	0.07 0.25 0.26	0.89 0.90 0.84	14.95 14.33 14.05	12.00 13.43 12.81	.....
		Quincy..... Boone City..... Elm..... Flat Rock..... Niles.....	0.35 0.38 0.46 0.28 0.37	0.27 0.27 0.26 0.19	0.19 0.15 0.23	0.84 0.84 0.87 0.79	14.50 14.60 13.50 13.20	13.05 13.40 13.38 12.46 12.18	.....
A 172* A 2683 A 2700 A 2845 A 2855 A 2801 A 3062	Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0. Tantage and Bone Phosphate 1-12-0.	Average.....	0.40	0.26	0.19	0.85	14.16	12.96	.....
		Lausang..... { G.† F.†	0.49 0.56 1.85	1.04 0.87 0.49	0.76 0.66 0.74	2.47 2.29 2.09	10.55 10.63 10.30	8.00 7.49 7.76	1.00 1.06 1.18
		Menominee..... Kalamazoo..... Dootur.....	0.95 0.96	0.83 0.80	0.06 0.56	2.51 2.32	10.20 10.42	3.08 3.43	1.06 1.27
		Average.....	0.96	0.80	0.56	2.32	10.42	6.99	1.14
A 2682 A 2607 A 3013 A 3053	Truck Fertilizer 3-8-1. Truck Fertilizer 3-8-1. Truck Fertilizer 3-8-1. Truck Fertilizer 3-8-1.	Adrian..... { G.† F.†	0.66 0.60 0.77	0.39 0.47 0.43	0.48 0.20 0.47	1.66 1.53 1.67	12.45 13.20 12.45	10.00 9.83 10.91	.....
		Union City.....	0.68	0.43	0.38	1.49	12.70	10.54	.....
		Average.....	0.68	0.43	0.38	1.49	12.70	10.54	.....
		Zealand..... { G.† F.†	0.20 0.53	0.27 0.06	0.29 0.10	0.89 0.66	9.66 9.05	8.00 8.11	2.00 1.91 2.49
A 2497* A 3676*	1-8-2 Fertilizer. 1-8-2 Fertilizer.	Average.....	0.37	0.16	0.19	0.72	9.36	7.93	2.20

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A 3119 A 3317	1-10-0 Fertilizer. 1-10-0 Fertilizer.	Charlotte, Clio.	{ G.† F.†	0.49 0.43	0.18 0.15	0.21 0.23	0.82 0.88 0.80	12.75 11.35 11.80	1.40 0.92	10.00 10.88
	Average.....			0.46	0.16	0.22	0.84	12.28	1.16	11.12
A 3201	1½-20 Bone Meal.	Ann Arbor.....	{ G.† F.†	0.59	0.90	0.45	1.43 1.94	20.00 21.80		
A 2738 A 2800 A 3042 A 3463*	2½-20 Bone Meal. 2½-20 Bone Meal. 2½-20 Bone Meal. 2½-20 Bone Meal.	Albion. North Adams. Hudsonville. Jamestown.	{ G.† F.† F.† F.†	0.57 0.45 0.49 0.39	1.14 1.28 1.39 0.82	0.62 0.42 0.51 0.64	1.88 2.33 2.15 1.85	29.00 28.75 28.88 31.10		
	Average.....			0.47	1.16	0.55	2.18	29.58		
A 3699*	10-4 Fertilizer.	Memphis.....	{ G.† F.†				11.90		1.36	10.00 10.44
A 132* A 3493*	12-2 Fertilizer. 12-2 Fertilizer.	Mason. Zeeland.	{ G.† F.†				13.75 12.70		0.90 0.80	12.00 11.90
	Average.....						13.23	0.85		12.38
A 3685* A 3687* A 3694*	1½-12-1½ Fertilizer. 1½-12-1½ Fertilizer. 1½-12-1½ Fertilizer.	Munger. Unionville. Dryden.	{ G.† F.† F.†	0.88 0.90 0.97	0.10 0.10 0.10	0.19 0.17 0.14	1.45 1.17 1.17 1.21	15.80 15.08 14.95	2.32 2.78 2.60	12.00 13.18 12.27 12.35
	Average.....			0.91	0.10	0.17	1.18	15.17	2.57	12.60
A 3554* A 3504* A 3593* A 3693*	2-10-4 Fertilizer. 2-10-4 Fertilizer. 2-10-4 Fertilizer. 2-10-4 Fertilizer.	Sarasac. Glenora. Fennville. Coruna.	{ G.† F.† F.† F.†	1.00 0.71 1.06 1.31	0.19 0.10 0.12 0.13	0.29 0.11 0.08 0.02	1.65 1.48 0.82 1.27 1.51	13.05 12.93 12.23 11.23	2.40 1.84 1.08 1.22	10.00 10.85 10.61 10.06
	Average.....			1.02	0.15	0.13	1.30	12.13	1.50	10.63
Virginia-Carolina Chemical Co., Cincinnati, O.										
A 1982 A 2793 A 2943 A 2981 A 3100 A 3472*	V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate. V.C 16% Acid Phosphate.	Coopersville. Erie. Carleton. Leawee Junction. Nunica. Nunica.	{ G.† F.† F.† F.† F.† F.†				18.60 19.60 19.85 18.80 19.40 18.40	16.00 17.16 18.72 19.08 17.58 18.70	1.44 0.88 0.78 1.24 0.34	16.00 17.16 18.72 19.08 17.58 18.06
	Average.....						19.11	0.89		18.22

†Abbreviations for Guaranteed and Found.
*Fall Samples.

FERTILIZER ANALYSES.

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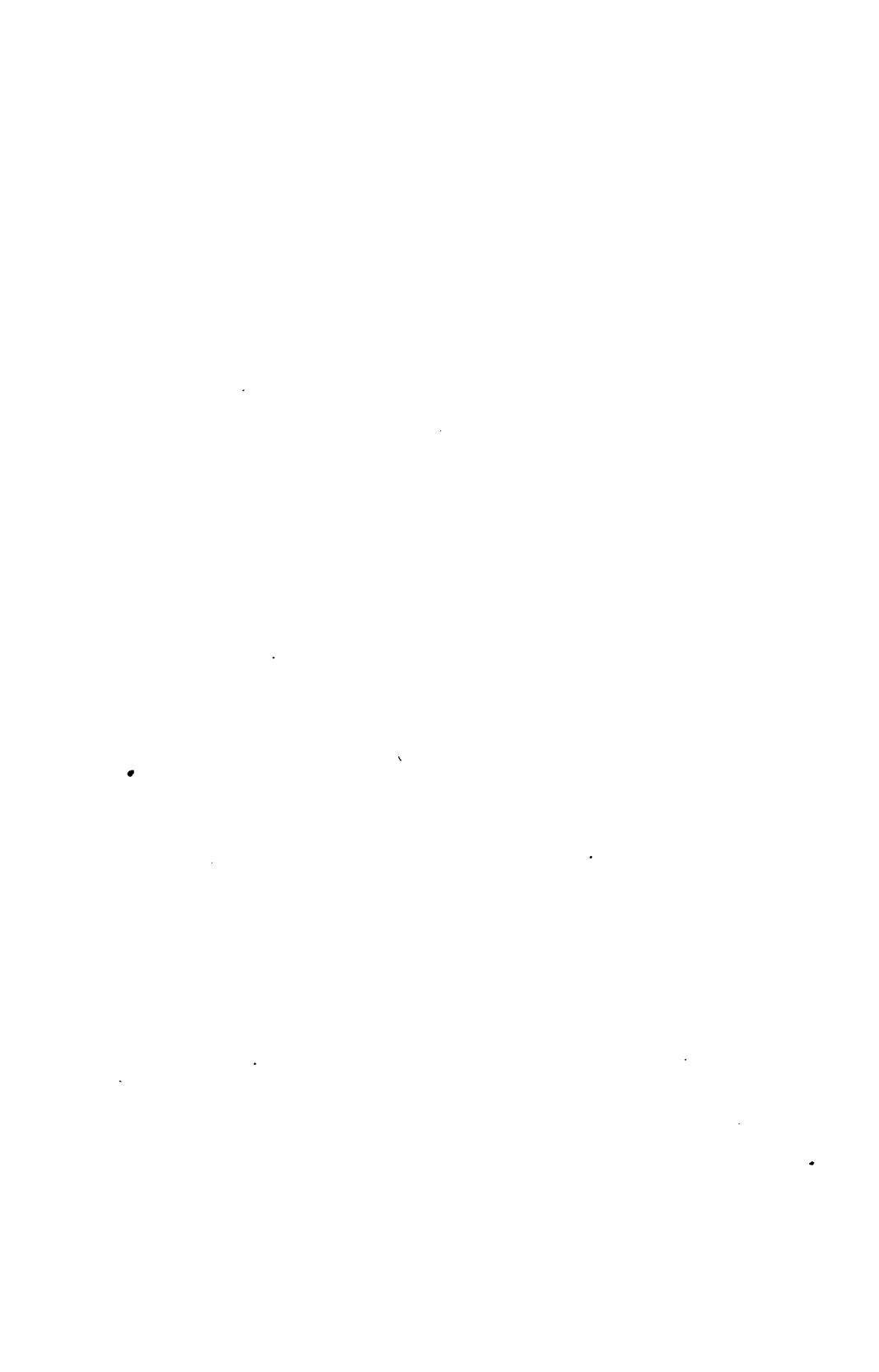
A 2932 A 3076	V-C Prolific Grain Grower. V-C Prolific Grain Grower.	Lenawee Junction. Jenison.						13.15 12.35	0.78 0.74	12.37 11.61	2.02 2.11
	Average.							12.55	0.79	11.76	2.05
A 2706 A 3216	V-C Red Cross 14%. V-C Red Cross 14%.	Erie. Milan.	{ G.† F.†					20.06 19.60	4.12 2.88	14.00 16.92	
	Average.							19.83	3.40	16.43	
A 2944	V-C Rescue Fertilizer.	Urania.	{ G.† F.†	1.11	0.37	0.30	1.65 1.78	13.10	0.78	11.00 12.32	
A 2984	V-C Richumun Fertilizer.	Lenawee Junction.	{ G.† F.†	0.04	0.19	0.30	0.41 0.53	14.60	1.56	18.00 13.04	
A 3447**	V-C Springfall Fertilizer.	Coopersville.	{ G.† F.†	1.39	0.15	0.09	1.65 1.63	13.65	0.62	18.00 13.08	2.00 2.79
A 2972	V-C Sure Grain Producer.	Manchester.	{ G.† F.†	0.27	0.22	0.34	0.82 0.83	15.75	0.44	15.00 15.31	
	Raisin Monumental Brands.										
A 2993 A 2767 A 3069	16% Acid Phosphate. 16% Acid Phosphate. 16% Acid Phosphate.	Batavia. Adrian. Eau Claire.	{ G.† F.†					19.63 18.90 19.55	0.88 1.08 0.60	16.00 18.75 17.82 18.95	
	Average.							19.36	0.85	18.51	
A 2766	30% Acid Phosphate.	Adrian.	{ G.† F.†					23.60	0.74	20.00 22.86	
A 2878 A 2933	Farmers Success. Farmers Success.	Lansing. Batavia.	{ G.† F.†	0.26 0.12	0.30 0.39	0.35 0.44	0.82 0.91 0.96	9.15 9.83	0.98 1.28	8.00 8.47 8.06	1.00 1.70 1.43
	Average.			0.19	0.35	0.39	0.93	9.39	1.13	8.26	1.57
A 2992	General Favorite.	Batavia.	{ G.† F.†	0.74	0.91	0.61	1.65 2.26	10.18	2.78	8.00 7.40	2.00 1.98
A 2977	Grain Fertilizer.	Lansing.	{ G.† F.†	0.53	0.31	0.24	0.82 1.08	14.78	0.90	15.00 13.88	
A 2979	Reliable Wheat and Corn Fertilizer.	Lansing.	{ G.† F.†	0.28	0.29	0.50	0.82 1.07	10.35	1.50	8.00 8.85	2.00 2.02
A 2771	Special Plant Food.	Adrian.	{ G.† F.†	1.06	0.36	0.24	1.66 1.66	13.90	0.92	11.00 12.98	

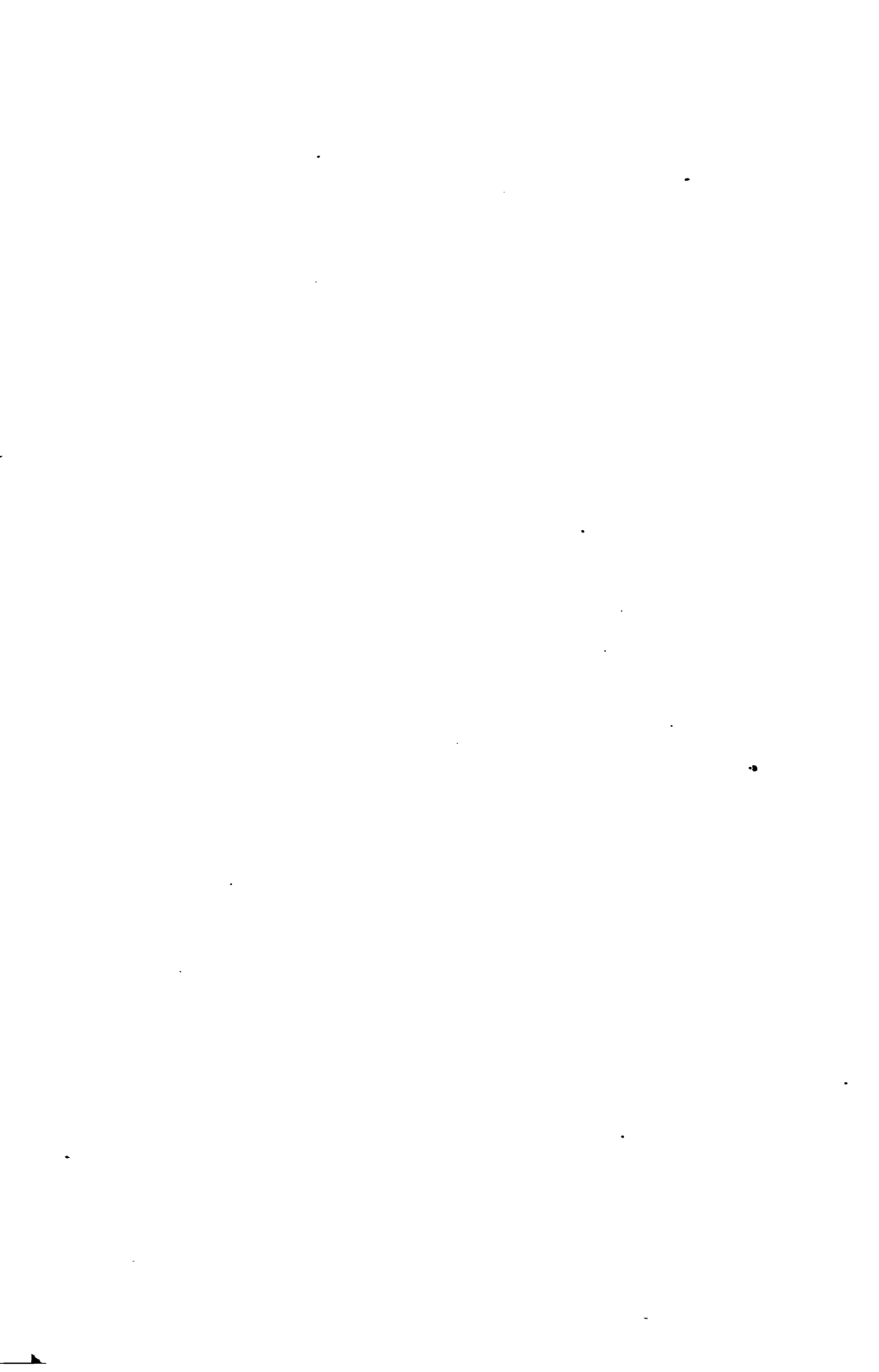
†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1919, EXPRESSED IN PARTS IN ONE HUNDRED.—CONTINUED.

Laboratory No.	Manufacturer and Trade Name.	Sampled at	Nitrogen.				Phosphoric Acid.			Potash.
			As Soluble.	As Active Insoluble Organic.	As Inactive Insoluble Organic.	Total	Total	Insoluble.	Available.	
A 3256	Wayne Soap Company, Detroit, Mich. Fertilo Brand Fertilizer.	Detroit.	{ G.† F.†	0.98	1.12	0.86	2.60 2.96	17.20	8.00 3.97	.....
		Garden Brand Fertilizer.	G.†				2.30		6.00	5.00
		Flint.	{ G.† F.†	1.52	1.46	0.84	4.00 3.82	24.20	8.00 7.52	.....
A 3315	Blood and Bone.	Lennon.	{ G.† F.†					17.30	14.00 16.96	.....
A 3395	Welchert Fertilizer Company, Dayton, Ohio. 14% Acid Phosphate.	Carson City.	{ G.† F.†				0.80	18.25	16.00 17.15	.....
A 3575*	16% Phosphate.		G.†				1.60		10.00	.....
EE Ammonia Special.			G.†						8.00	.....
EE Raw Bone & Phosphate.			G.†				0.40	14.80	11.00	.....
A 146*	EE Ruby Phosphate.	Mason.	{ G.† F.†	0.20	0.10	0.08	0.36		13.72	.....
A 2688	EE Ruby Phosphate.	Dayton.	0.15	0.21	0.13	0.49	0.36	12.60	11.04	.....
A 2748	EE Ruby Phosphate.	Owosso.	0.11	0.21	0.16	0.48	0.43	12.90	11.92	.....
A 3121	EE Ruby Phosphate.	Mur.	0.19	0.14	0.11	0.44	0.44	12.35	11.21	.....
A 3126	EE Ruby Phosphate.	Carson City.	0.14	0.19	0.09	0.42	0.42	13.15	11.67	.....
A 3369*	EE Ruby Phosphate.	Ovid.	0.13	0.21	0.11	0.45	0.45	11.00	8.96	.....
	Average.		0.15	0.18	0.11	0.44	0.44	12.80	11.42	.....
A 125*	EE Spot Cash.	Lapeer.	{ G.† F.†	0.12	0.21	0.37	0.80		8.00	1.00
A 147*	EE Spot Cash.	Mason.	0.15	0.14	0.30	0.59	0.70	10.70	7.73	1.83
A 2744*	EE Spot Cash.	Owosso.	0.35	0.23	0.31	0.91	0.88	11.55	9.31	1.08
A 2745*	EE Spot Cash.	Perry.	0.27	0.26	0.24	0.79	0.79	8.58	6.76	1.10
A 3120*	EE Spot Cash.	Mur.	0.23	0.15	0.31	0.69	0.69	13.40	10.16	0.74
	Average.		0.22	0.20	0.31	0.73	0.73	9.70	7.94	0.94
								10.79	8.47	1.15

†Abbreviations for Guaranteed and Found.
*Fall Samples.





BULLETIN NO. 288

SEPTEMBER, 1920

MICHIGAN AGRICULTURAL COLLEGE



EXPERIMENT STATION

CHEMICAL SECTION

COMMERCIAL FEEDING STUFFS

By
ANDREW J. PATTEN, O. B. WINTER, M. L. GRETTEMBERGER
and P. O'MEARA

EAST LANSING, MICHIGAN
1920



The Station

The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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Postoffice and Telegraph address, - - - - - East Lansing, Mich.
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MILLER, E. J., M. S. - - -	Research Asst. in Chemistry	JOHNSTON, S., B. S., Supt. South Haven Horticultural Exp. Station	
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		FROST, BESSIE - - -	Stenographer
		MEZHAN, GERTRUDE - - -	Stenographer

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
South Haven, Van Buren County, 10 acres rented; 5 acres deeded.
Graham Station, Kent County, 50 acres donated.

COMMERCIAL FEEDING STUFFS.

The inspection of commercial feeding stuffs is made under authority of an act of the Legislature which became operative April 1st, 1918 (Act 91, P. A. 1917). Only the more important provisions of the law are here set forth but the full text will be sent to any person upon request.

Label. Every lot or parcel of "commercial feeding stuffs" shall bear on the bags or tags attached thereto a statement certifying, 1st, the net weight of the contents of the package, lot, or parcel; 2nd, the name, brand or trademark; 3rd, the name and principal address of the manufacturer or person responsible for placing the commodity on the market; 4th, the minimum percentage of crude protein, the minimum percentage of crude fat and the maximum percentage of crude fibre; 5th, the specific name of each ingredient used in its manufacture.

Registration. All "commercial feeding stuffs" within the meaning of the act must be registered annually, on or before January 1st or before the feed is placed on sale and the license fee is \$20.00 per brand.

Samples not required. The forwarding of samples at the time of applying for license is not necessary except when requested by the administrative officer.

Registrations may be refused or cancelled. The administrative officer may refuse to license a brand if the name appears to be deceptive or misleading. He also has power to cancel a license if it appears, at any time, that any of the provisions of the law have been violated.

Materials exempt from license fee. Unmixed whole seeds and grains; unmixed meals made directly from the entire grains of corn, wheat, rye, barley, oats, buckwheat, flaxseed, kafir and milo; corn and oats feed made by grinding together the pure grains of corn and oats; wheat, rye and buckwheat brans or middlings when unmixed with other materials; whole hays, straws, ensilage and corn stover when unmixed with other materials and all materials containing 60 per cent or more of water.

RULES.

Authority is given the State Board of Agriculture to prescribe and enforce such rules and regulations relating to the sale of commercial feeding stuffs as might be deemed necessary to carry into effect the full intent and meaning of the law. In accordance therewith the following rules have been adopted by the said Board and are now in force.

The following rules were passed by the State Board of Agriculture at a meeting held March 20, 1918, in East Lansing, Michigan:

RULE No. 1. "*Wheat Bran* with Screenings not exceeding *Mill Run*" is interpreted as meaning bran to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the bran. The Screenings may or may not be reduced.

RULE No. 2. "*Wheat Middlings* with Screenings not exceeding *Mill Run*" is interpreted as meaning middlings to which has been added, by a separate process, the whole or a part of the screenings separated from the particular lot of wheat producing the middlings. The screenings may or may not be reduced.

RULE No. 3. "*Wheat Bran and Wheat Middlings*" when labelled as containing "Screenings not exceeding *Mill Run*" are considered to be "Commercial Feeding Stuffs" within the meaning of the law and subject to license. This rule shall take effect April 1st, 1918.

RULE No. 4. "*Statement of Guaranteed Analysis.* Section 2 of the Feeding Stuffs law is interpreted to mean that only the minimum guarantees for Protein and Fat and the maximum guarantee for Crude Fiber may be stated on the labels. The sliding guarantee is prohibited. This rule shall take effect April 1st, 1918."

RULE No. 5. *Inert Materials.* It is permissible to use grit, oyster shells, charcoal, and similar materials in compounding poultry feeds, providing, that not more than five (5) per cent of such inert material is used. The words "grit," "charcoal," etc., must constitute a part of the brand name of all feeds containing these ingredients and must be printed in the same size and face of type as the balance of the name, as **PRIME POULTRY FEED WITH GRIT AND CHARCOAL.**

RULE No. 6. *Seeds, Field Seeds, Miscellaneous Seeds.* These terms will not be accepted in the list of ingredients to cover a mixture of weed seeds. When such seeds are used in excess of five (5) per cent, the common name of each variety of seed must be given on the registration form and also on the tag or label. When used in amount less than five (5) per cent they may be registered as screenings providing the source of the screenings is given, as "clover screenings," "wheat screenings," etc.

RULE No. 7. *Screenings.* Screenings if sold as such without grinding, need not be licensed. If ground, they become a mixed meal and must be registered and labeled.

RULE No. 8. *Oat Feed.* This term will not be accepted when used to indicate any material other than whole or ground oats. Mixtures of oat shorts, oat middlings and oat hulls will not be accepted under the term and the name of each separate ingredient will be required.

RULE No. 9. *Changing Guarantees.* Guarantees either as regards composition or ingredients will be changed only upon application by the manufacturer accompanied with a statement of the reasons for making such change. The old license certificate must be surrendered before a new one will be issued.

RULE No. 10. *Unlicensed Feed.* When any unlicensed "commercial feeding stuffs" as defined in section 1 of the law is found being offered for sale, the agent or dealer offering the feed for sale is notified and advised to remove it from sale. Those failing to accept the advice and heed the notice will be reported for violation of the law.

RULE No. 11. *Samples not Meeting Guarantee.* In the case of appreciably deficient or of adulterated samples the manufacturer is given ten days' advance notice in which to file objections. A portion of the official sample is furnished if requested. As soon as the deficiency or adulteration is detected, the agent or person offering the feed for sale is notified and advised to remove it from sale. Those failing to accept this advice will be reported for violation of the law.

RULE No. 12. *Discarding or Substituting Samples.* All requests for discarding or substituting samples will be refused unless an error on the part of an agent of the State Board of Agriculture can be shown.

RULE No. 13. *Prosecutions.* Original shippers of unlicensed, adulterated or misbranded feeds will be prosecuted in all cases where it is possible to do so either under the State law or through co-operation with the United States Department of Agriculture under the Federal Food and Drugs Act. *Local dealers*, however, are directly responsible under the law for the feed they offer for sale and will be held accountable for failure of such feed to meet the requirements of the law, especially for selling a feed when notified to withdraw it from sale.

RULE No. 14. *Statement of Ingredients.* The attention of those desiring to register feeds for sale in this State is especially directed to the requirement of the law regarding the declaration of ingredients. Each and every substance used in compounding feed must be given in the list of ingredients without regard to the purpose for which it may be used.

RULE No. 15. *Net Weight.* The law requires that the "net weight of the package lot or parcel" be stated on the label. A statement of the gross weight only, will be considered to be a case of misbranding and dealt with accordingly.

RULE No. 16. *Fees.* The license fee, required by law, is twenty dollars (\$20.00) per brand. This should be paid on or before January 1st of each year or before the feed is placed on sale. All requests for a reduction of the license fee when the registration is made after the first of the year will be refused.

RULE No. 17. *Rebates.* The Michigan feed law makes no provision for the payment of rebates to cover deficiencies and although this practice often shows the good intention of the manufacturer, the payment of such rebates will have no bearing on any subsequent action which may be taken in cases of violation of the law. When rebates are paid, dealers will be expected to pro-rate them to the purchasers so that the consumers may receive their benefit.

POINTS OF INTEREST TO DEALERS.

Represent only Reliable Firms and before purchasing feed for resale in Michigan, find out if the particular feed has been properly licensed by the manufacturer, broker, or party responsible for its shipment into the State. The State law has no jurisdiction over parties residing outside of the State and the only way they can be reached is through the U. S. Department of Agriculture for a violation of the Federal Food and Drugs Act. Failure to license a feed in Michigan would not be a violation of the Federal law and if properly tagged, shipment into the State cannot be prevented. The Michigan law becomes operative only when such feed is offered for sale within the State. Ignorance of the provisions of the law is not sufficient grounds for defense. When the inspectors find an unlicensed feed being offered for sale the dealer is given written notice and requested to discontinue the sale until the person or concern responsible for shipping the product into the State has complied with the requirements of the law. *Dealers who continue to sell unlicensed feeds after due notice has been given will be held responsible and evidence of the violation of the feeding stuffs law will be submitted to the Prosecuting Attorney in the county wherein the violation occurs.*

The feeding stuffs law requires that when feed is offered for sale in bulk the dealer shall keep on hand cards upon which shall be printed the information indicated under paragraph two, page three, and upon request the purchaser shall be furnished with such a card. This requirement applies to all sales no matter how small and must be fulfilled by dealers and grocers who make a practice of selling feeds from open barrels or tubs. That no hardship may be worked on those handling but small quantities of feed, the administrative officer holds that the law is complied with if the dealer attaches to the container from which the feed is sold a placard giving the information above specified.

Frequently it occurs that carload shipments reach their destination untagged. In such cases the dealer should telephone or telegraph the manufacturer or jobber immediately for proper tags and insist upon getting them at once as the sale of untagged feeds is not permissible under any circumstances. Tags sent forward by mail or placed in a carload of feed but not attached to the bags should be put on as the car is unloaded. Some responsible person should give the matter of proper tagging careful attention rather than trust it to some irresponsible laborer.

Retain Freight Bills. The State inspectors of feeding stuffs are also federal inspectors and authorized to take samples of shipments made in violation of the Federal Food and Drugs Act. In order to establish evidence of interstate shipment it is necessary to secure copies of the freight bill, bill of lading and bill of sale covering a shipment. Dealers should, therefore, keep on file all the documents and papers relating in any way to all interstate shipments of feed stuffs.

POINTS OF INTEREST TO PURCHASERS.

Consult the annual bulletin and find out what companies are most consistently meeting their guarantees.

Examine the labels for guaranteed analysis and list of ingredients. Remember that, as a general rule, a high fiber content indicates the presence of low grade materials.

Do not send samples for analysis without first writing for instructions as to method of securing a representative sample. This is important. A sample from one bag or a handful taken from the top of several bags is not a representative sample. Official inspectors are continually collecting samples of feeding stuffs and in most cases we can furnish information concerning a particular brand from data already on hand.

When purchasing feeds in car lots, an inspector will be sent to draw samples, upon request.

Do not accept feed in untagged or unlabeled bags except that which is exempt from the requirements as heretofore mentioned. An untagged package gives the purchaser no guarantee as to analysis or ingredients and, furthermore, the product is sold in violation of the feeding stuffs law. Such cases should be brought to the attention of the chemist.

When buying bulk feeds that are subject to license, demand of the seller a printed guarantee giving the chemical analysis and ingredients. The law provides that the purchaser may have this information.

COOPERATION WITH U. S. DEPARTMENT OF AGRICULTURE.

Through a plan of cooperation devised by the U. S. Department of Agriculture the State inspectors are empowered to collect samples from interstate shipments under the Federal Food and Drugs Act. All such samples found below guarantee or which for any other reason are in violation of this act are referred to the office of the Central Inspection District in Chicago. During the past year forty cases have been so referred for action in the Federal courts.

DEFINITIONS.

The Association of Feed Control Officials of the United States has, during the past 9 years, adopted definitions for various feeds as they have appeared on the market. This list now includes 65 official and 16 tentative definitions. The majority of these feeds are by-products in the manufacture of foods for human consumption. In making the definitions the source of the material as well as the process of manufacture is taken into consideration. Therefore, by studying these definitions feed buyers may be able to tell what ones are of low feeding value.

Materials of low feeding value may be shipped and sold in this State providing the requirements of the law are satisfied. It is therefore, the duty of each purchaser to become familiar with the various materials as defined, since all mixed feeds are made up of the materials included in this list.

These definitions are recognized as official in Michigan and manufacturers are expected to adhere to them in declaring the ingredients of mixed feeds.

The definitions as revised and adopted at the last meeting of the Association of Feed Control Officials are as follows:

Meal is the clean, sound, ground product of the entire grain, cereal or seed which it purports to represent.

Chop is a ground or chopped feed composed of one or more different cereals or by-products thereof. If it bears a name descriptive of the kind of cereals, it must be made exclusively of the entire grains of those cereals.

Screenings are the smaller imperfect grains, weed seeds and other foreign material having feeding value, separated in cleaning the grain.

Alfalfa Meal is the entire alfalfa hay ground, and does not contain an admixture of ground alfalfa straw or other foreign materials.

ANIMAL PRODUCTS.

Blood Meal is ground dried blood.

Cracklings are the residue after partially extracting the fats and oils from the animal tissue. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

Digester Tankage is the residue from animal tissue exclusive of hoof and horn, specially prepared for feeding purposes by tanking under live steam, drying under high heat, and suitable grinding. If it contains more than 10 per cent of phosphoric acid (P_2O_5), it must be designated Digester Meat and Bone Tankage.

Meat Scrap and Meat Meal are the ground residues from animal tissue exclusive of hoof and horn. If they contain more than 10 per cent of phosphoric acid (P_2O_5), they must be designated Meat and Bone Scrap, and Meat and Bone Meal. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

BARLEY PRODUCTS.

Barley Feed is the entire by-product resulting from the manufacture of pearl barley made from clean barley.

Barley Mixed Feed is the entire offal from the milling of barley flour from clean barley and is composed of barley hulls and barley middlings.

BREWERS' AND DISTILLERS' PRODUCTS.

Brewers' Dried Grains are the properly dried residue from cereals obtained in the manufacture of beer.

Distillers' Dried Grains are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

Malt Sprouts are the sprouts of the barley grain. If the sprouts are derived from any other malted cereal, the source must be designated.

BUCKWHEAT PRODUCTS.

Buckwheat Shorts or Buckwheat Middlings are that portion of the buckwheat grain immediately inside of the hull after separation from the flour.

CORN PRODUCTS.

Corn Bran is the outer coating of the corn kernel.

Corn Feed Meal is the by-product obtained in the manufacture of cracked corn, with or without aspiration products added to the siftings, and is also the by-product obtained in the manufacture of table meal from the whole grain by the non-degerminating process.

Corn Germ Meal is a product in the manufacture of starch, glucose and other corn products, and is the germ layer from which a part of the corn oil has been extracted.

Grits are the hard, flinty portions of Indian corn, without hulls and germ.

Corn Gluten Meal is that part of commercial shelled corn that remains after the separation of the larger part of the starch, the germ and the bran, by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Corn Gluten Feed is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germ by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Hominy Feed, Hominy Meal or Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the white corn kernel obtained in the manufacture of hominy, hominy grits and corn meal by the degerminating process.

Yellow Hominy Feed, Yellow Hominy Meal or Yellow Hominy Chop is a kiln-dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the yellow corn kernel obtained in the manufacture of yellow hominy grits and yellow corn meal by the degerminating process.

OIL CAKE.

Oil Cake is the residual cake obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product, the name of the seed from which it is obtained shall be prefixed to "oil cake."

Ground Oil Cake is the product obtained by grinding oil cake. When used alone, the term "ground oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "ground oil cake."

COTTONSEED PRODUCTS.

Cottonseed Meal is a product of cottonseed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 36 per cent of protein.

Choice Cottonseed Meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint and must contain at least 41 per cent of protein.

Prime Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent of protein.

Good Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

Cottonseed Feed is a mixture of cottonseed meal and cottonseed hulls containing less than 36 per cent of protein.

Cold Pressed Cottonseed is the product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire cottonseed less the oil extracted.

Ground Cold Pressed Cottonseed is the ground product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire ground cottonseed less the oil extracted.

LINSEED AND FLAX PRODUCTS.

Linseed Meal is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes, provided that the final product shall not contain over 6 per cent of weed seeds and other foreign materials and provided further that no portion of the stated 6 per cent of weed seeds and other foreign materials shall be deliberately added.

Oil Meal is the ground product obtained after the extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from seeds which have been screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Oil Meal" shall be understood to designate linseed meal as defined. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to the words "oil meal."

Old Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Old Process Oil Meal" shall be understood to designate linseed meal as defined, made by the old process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "old process oil meal."

New Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, heating and the use of solvents from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone "New Process Oil Meal" shall be understood to designate linseed meal as defined, made by the new process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "new process oil meal."

Flax Plant By-Product is that portion of the flax plant remaining after the separation of the seed, the bast fiber and a portion of the shives, and consists of flax shives, flax pods, broken and immature flax seeds and the cortical tissue of the stem.

Ground Flaxseed or Flaxseed Meal is the product obtained by grinding flaxseed which has been screened and cleaned of weed seeds and other foreign material by the most improved commercial processes, provided that the final product shall not contain over 4 per cent of weed seeds and other foreign materials, and provided further that no portion of the stated 4 per cent of weed seeds and other foreign materials shall be deliberately added.

Unscreened Flaxseed Oil Feed is the ground product obtained after extraction of part of the oil from unscreened flaxseed by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents. When sold without grinding the unground product shall be designated as "unscreened flaxseed oil feed cake."

Ingredients of Unscreened Flaxseed Oil Feed—Ground cake from partially extracted flaxseed and foreign seeds (wheat, wild buckwheat, pigeon grass, wild mustard, etc.)

Screenings Oil Feed is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from the smaller imperfect grains, weed seeds and other foreign materials having feeding value separated in cleaning the grain. The name of the grain from which the screenings are separated shall be prefixed to "screenings oil feed."

OAT PRODUCTS.

Oat Groats are the kernels of the oat berry.

Oat Hulls are the outer chaffy coverings of the oat grain.

Oat Middlings are the floury portion of the oat groat obtained in the milling of rolled oats.

Oat Shorts are the covering of the oat grain lying immediately inside the hull, being a fuzzy material carrying with it considerable portions of the fine floury part of the groat obtained in the milling of rolled oats.

Clipped Oat By-Product is the resultant by-product obtained in the manufacture of clipped oats. It may contain light, chaffy material broken from the ends of the hulls, empty hulls, light, immature oats and dust. It must not contain an excessive amount of oat hulls.

PEANUT PRODUCTS.

Peanut Oil Cake is the residue after the extraction of part of the oil by pressure or solvents from peanut kernels.

Peanut Oil Meal is the ground residue obtained after the extraction of part of the oil from peanut kernels.

Unhulled Peanut Oil Feed is the ground residue obtained after extraction of part of the oil from whole peanuts, and the ingredients shall be designated as "peanut meal and hulls."

RICE PRODUCTS.

Rice Bran is the cuticle beneath the hull.

Rice Hulls are the outer chaffy coverings of the rice grain.

Rice Polish is the finely powdered material obtained in polishing the kernel.

WHEAT PRODUCTS.

Wheat Bran is the coarse outer coating of the wheat kernel as separated from cleaned and scoured wheat in the usual process of commercial milling.

Standard Middlings (Red Shorts or Brown Shorts) consists mostly of the fine particles of bran, germ and very little of the fibrous offal obtained from the "tail of the mill." This product must be obtained in the usual commercial process of milling.

Gray Shorts (Gray Middlings or Total Shorts) consists of the fine particles of the outer bran, the inner or "bee-wing" bran, the germ, and the offal or fibrous material obtained in the usual commercial process of flour milling.

Flour Middlings shall consist of standard middlings and red dog flour combined in the proportions obtained in the usual process of milling.

White Shorts or White Middlings consists of a small portion of the fine bran particles and the germ and a large portion of the fibrous offal obtained from the "tail of the mill." This product must be obtained in the usual process of flour milling.

Red Dog Flour consists of a mixture of low-grade flour, fine particles of bran and fibrous offal from the "tail of the mill."

Wheat Mixed Feed (Mill Run Wheat Feed) consists of pure wheat bran and the gray or total shorts or flour middlings combined in the proportions obtained in the usual process of commercial milling.

Wheat Bran and Standard Middlings consists of the two commodities as defined above mixed in the proportions obtained in the usual process of commercial milling.

Screenings consist of the smaller imperfect grains, weed seeds and other foreign materials, having feeding value, separated in cleaning the grain.

Scourings consists of such portions of the cuticle, brush, white caps, dust, smut and other materials as are separated from the grain in the usual commercial process of scouring.

(NOTE) If to any of the wheat by-product feeds there should be added screenings or scourings, as defined either ground or unground, bolted or unbolted, such brand shall be so registered, labeled and sold as clearly to indicate this fact. The word "Screenings" or "Scourings" as the case may be, shall appear as a part of the name or brand and shall be printed in the same size and face of type as the remainder of the brand name. When the word "Screenings" appears it is not necessary to show also on the labeling the word "Scourings."

MISCELLANEOUS PRODUCT.

Dried Beet Pulp is the material obtained by drying the residue from sugar beets which have been cleaned and freed from crowns, leaves and sand and which have been extracted in the process of manufacturing sugar.

Cocoanut Oil Meal ("Copra Oil Meal") is the ground residue from the extraction of part of the oil from the dried meat of the cocoanut.

Ivory Nut Meal is ground ivory nuts.

Palm Kernel Oil Meal is the ground residue from the extraction of part of the oil by pressure or solvents from the kernel of the fruit of *Elaeis guineensis* or *Elaeis malanococca*.

Yeast or Vinegar Dried Grains are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar, and consists of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugars, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast.

TENTATIVE DEFINITIONS.

Barley Hulls are the outer chaff coverings of the barley grain.

Choice Cottonseed Meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of hulls and lint, and must contain at least 41.12 per cent protein.

Medium Grade Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.56 per cent of protein.

Low Grade Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

Distillers' Corn Solubles a by-product from the manufacture of alcohol from corn, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Distillers' Corn and Rye Solubles a by-product from the manufacture of alcohol from corn and rye, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Distillers' Rye Solubles a by-product from the manufacture of alcohol from rye, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Fish Meal shall be the dried ground residue from fish. It shall be made from undecomposed fish and the oil contained therein must not be rancid.

Fish Oil Meal shall be the undecomposed product from the extraction of oil from fish or fish residues.

Non-Oily Fish Meal shall be the clean undecomposed residue from the manufacture of glue from non-oily fish.

Rice Bran is the cuticle of the rice grain, with only such quantity of hull fragments as is unavoidable in the regular milling of rice.

Rye Middlings (Rye Feed) consists of the products other than the flour obtained in the manufacture of the ordinary or "100%" rye flour from the rye grain which has been cleaned and scoured.

Rye Red Dog Flour consists of a mixture of low-grade flour, fine particles of bran and the fibrous offal from the "tail of the mill."

Velvet Bean Meal is ground velvet beans containing only an unavoidable trace of hulls or pods.

Ground Velvet Bean and Pod is the product derived by grinding velvet beans "in the pod." It contains no additional pods or other material.

Wheat Ship Stuff is the entire offal exclusive of the outer bran obtained in the usual process of commercial milling of flour.

DISCUSSION OF RESULTS.

During the past year 1,011 samples of commercial feeding stuffs were collected and analyzed. The results appear in the following pages. While we have no way of arriving at an accurate estimate of the magnitude of the feed business in Michigan, it is assumed that, at least, 250,000 tons of "commercial feeding stuffs" representing a retail value of approximately \$15,000,000 were sold during the past year.

The inspection of these feeds has been conducted by the Chemical Section under the direction of the State Board of Agriculture since January, 1916. The following table will show what influence this inspection has had upon the feeds sold during that time. It will be noted that the total number of samples found to be deficient or not equal to guarantee has decreased nearly 50 per cent. Furthermore, the number of samples of cottonseed meal found below guarantee has decreased from over 50 per cent in 1916 to slightly less than 10 per cent during the past year.

Year.	No. samples analyzed.	No. samples deficient.	Per cent of samples deficient.
1916.....	1,002	264	26.3
1917.....	836	207	24.8
1918.....	897	220	24.5
1919.....	1,508	241	16.0
1920.....	1,011	157	15.5

A discussion of the results for each class of feeding stuffs follows.

COTTONSEED MEAL.

One hundred twenty-one samples of cottonseed meal were analyzed. Only 12 samples or 10% were found below guarantee. All but six of these samples were tagged as 36% Cottonseed Meal. It is unfortunate that so much of the cottonseed meal shipped into the State is of the low grade type. It should be generally understood that this grade of cottonseed is produced by diluting or adulterating the better grades with cottonseed hulls.

COTTONSEED FEED.

Eight samples of this class, all of which were shipped by one company, were analyzed. Five of these or 62.5% were found to be deficient. Because of the long freight haul from the south where the cottonseed is produced it is not economical to buy this grade of cottonseed product in this section.

LINSEED MEAL.

Seventy-one samples of this feed were collected and analyzed. Twenty-five or 35.2% of the samples were found to be deficient. This poor showing is explained by the fact that the flax crop in this country was very short last year and a large amount was imported from South America. This imported flaxseed produced a meal with a lower protein content than the domestic flax, which fact, the crushers failed to appreciate

until considerable quantities had been shipped. Most of the crushers using South American seed were obliged to lower their protein guarantees during the year.

MALT GRAINS.

Only three samples of this class of feed were found during the year, all of which were equal to guarantee. This material is a by-product in the production of malt used in the manufacture of breakfast foods. It is very similar to brewers grains.

CORN GLUTEN FEED.

Ten samples of gluten feed were found, only one of which, was below guarantee. The retail price varied from \$65.00 to \$80.00 per ton.

MALT PROCESS GLUTEN.

This is a new feed that appeared on the market during the year and is a by-product in the manufacture of malt syrup and malt sugar. This differs from ordinary corn gluten feed by having a very much higher fat content. One sample was found to contain a high protein content of 31.5% while the two other samples, both of which were taken from a single shipment, were very much lower in protein and considerably under the manufacturer's guarantee. The product has not, as yet, become standardized but it should add another valuable addition to our list of feeding stuffs.

HOMINY FEED.

Seven samples of this class were obtained and analyzed all of which satisfied the guarantees in every particular.

CORN GERM MEAL.

Three samples representing two manufacturers were obtained and analyzed. They all exceeded the guarantees by substantial margins.

CORN FEED MEAL.

Ten samples, all from local manufacturers, were analyzed of this class. None were found to be below guarantee.

ANIMAL BY-PRODUCTS.

Twenty-two samples, consisting of 15 samples of tankage, 5 of meat scraps, 1 of poultry bone and 1 of meat and bone scraps were analyzed. The protein guaranteed in the tankage samples varied from 40 to 60 per cent. Five samples failed to equal the protein guarantee. Some of the samples were high in fat which indicates an inefficient rendering process.

ALFALFA PRODUCTS.

Three samples of alfalfa meal and 7 samples of alfalfa meal and molasses were collected and analyzed. Five samples of alfalfa meal and molasses, the product of one company were found to be below

guarantee in protein and three of the five exceeded the fiber guarantee. The low protein and high fiber figures obtained in these cases indicates an excessive amount of stems. Two other samples were high in crude fiber.

CALF MEALS.

Twenty-three samples, representing 13 manufacturers, are tabulated. Five samples were below guarantee in protein, 2 were below in fat and 2 exceeded the fiber guarantee. In all but three cases the ingredients claimed were found to be present.

HOG FEEDS.

Forty-eight samples, representing 20 manufacturers are tabulated. Two samples were below guarantee in protein, 2 were below in fat and 5 exceeded the fiber guarantee. Several of these mixtures are too high in crude fiber to be satisfactory as hog feeds. In selecting hog feeds the matter of fiber should be carefully considered since the hog has a comparatively small stomach and bulky feeds containing considerable dry roughage should be avoided.

DAIRY AND STOCK FEEDS.

One hundred samples of this class were analyzed, of which 21 were found to be deficient in one or more particular. The greatest number of deficiencies were in fat, thirteen samples being below guarantee. There is a very wide variation in the composition of the feeds intended for dairy cows, both as to chemical composition and ingredients. The protein guaranteed, varies from 13.5 per cent to 26 per cent. The low guarantee is much too low except, perhaps, where it may be fed with a good grade of alfalfa hay as roughage. Cottonseed and linseed meals are almost invariably present in dairy feeds; wheat bran, wheat middlings are also common ingredients as well as gluten feed. The cheaper priced feeds almost invariably have such low grade materials as oat hulls, clipped oat by-product or ground screenings. When these low grade materials are present it also generally happens that the crude fiber is high.

MOLASSES DAIRY AND STOCK FEEDS.

Fifty samples in this class were analyzed of which 15 or 30 per cent were below guarantee. Fourteen of the samples were deficient in protein, eight contained an excess of fiber and five were deficient in fat. In these feeds it is customary to use some low grade material such as ground clipped oat by-product, ground oat hulls, or ground screenings to act as an absorbent of the molasses.

HORSE FEEDS.

Nine samples of horse feed without molasses and 35 samples with molasses were analyzed. Three samples of the latter class were found below guarantee. These are usually comparatively simple mixtures consisting of alfalfa, cracked corn, oats and molasses.

POULTRY FEEDS.

Two hundred forty-seven samples in this class were analyzed. Of these 112 were scratch feeds without grit, 40 scratch feeds with grit, 34 were chick feeds, 9 pigeon feeds and 51 were mash feeds. Fourteen or 5.7 per cent of all the samples were below guarantee.

CORN AND OATS FEEDS.

Eighteen samples were collected and analyzed five of which were found to be deficient. Many of these samples are mixtures of oat hulls and corn feed meal while a few are mixtures of ground oats and corn. The list of ingredients which must be printed on the label indicates, in every case, those mixtures that contain the ground oat hulls.

OAT MEAL MILL BY-PRODUCT FEEDS.

Eight samples are included under this classification. The mill run by-product from an oat meal mill consists of a little more than 90 per cent oat hulls, the feeding value of which is no better than that of wheat straw. Three of the samples are probably the entire by-product consisting of oat hulls and oat shorts but four of them were plain oat hulls the average retail price of which was \$29.67 per ton.

CEREAL FOOD BY-PRODUCTS.

Seventeen samples are included under this classification only two of which were found to be deficient. These materials are mostly by-products in the manufacture of breakfast foods and are, essentially, carbohydrate feeds.

WHEAT BRAN.

Sixty-six samples of wheat bran with screenings not exceeding mill run were analyzed. Four samples exceeded the fiber guarantee and one was deficient in protein. Changes and improvements in the process of milling wheat are, apparently, having an influence upon the composition of the by-products. Many people have been viewing this situation with considerable alarm. In order to determine what effect, if any, this has had upon the composition of the wheat brans analyzed during the past year, the average analysis of all the samples is compared with the average of 7,742 samples reported in "Feeds and Feeding" by Henry and Morrison.

	Protein.	Fat.	Crude Fiber.
	%	%	%
Average of 7,742 samples	16.0	4.4	9.5
Average of 66 samples	15.7	4.4	10.2

It will be seen that there is a slight decrease in the protein with a somewhat larger increase in the crude fiber in the 66 samples of bran analyzed during the past year when compared with the large number of analyses compiled by Henry and Morrison.

WHEAT MIDDINGS.

Seventy-two samples of middlings were analyzed only 4 of which were below guarantee. Nearly all of these samples were shorts or standard middlings with a very few samples of white middlings and flour middlings.

In glancing over the results of analysis it will be noticed that most of the standard middlings have a crude fiber content considerably in excess of 6 per cent which is the average given by Henry and Morrison in "Feeds and Feeding." More than 50 per cent of the samples have a crude fiber content in excess of 7 per cent.

Much confusion has been caused by the definition for Flour Middlings adopted at the last meeting of the Association of Feed Control Officials. For many years the term Flour Middlings has been synonymous with fine white middlings but according to the new definition it is a mixture of Standard Middlings and Red Dog "combined in the proportions obtained in the usual process of milling." This gives a mixture differing but little from standard middlings and very little, if any, better than the product that formerly was sold as standard middlings. Feeders should study these definitions carefully that they may become more familiar with the different classes of middlings.

WHEAT MIXED FEEDS.

This class includes the entire by-product from the manufacture of flour or the bran and middlings mixed in the proportions obtained in the commercial milling of flour. Fourteen samples were analyzed, all of which were above the guarantees. It is a rather significant fact that the average crude fiber content of these 14 samples of wheat mixed feed is 7.72 per cent while the average crude fiber content of the 72 samples of middlings is 7.38 per cent. Henry and Morrison give 6.00 per cent as the average for standard middlings and 7.6 per cent for wheat mixed feed.

WHEAT AND RYE MIXED FEED.

This class comprises 4 samples of mixed wheat and rye middlings. Two samples were below guarantee in fat and one in protein.

RYE FEED.

Two samples of the entire by-product obtained in milling rye flour and one sample of rye middlings were analyzed. One sample was found to be below guarantee in protein.

MISCELLANEOUS FEEDS.

This classification includes 31 samples of a miscellaneous nature. Five samples of cottonseed hulls were analyzed and special attention is called to the high crude fiber and very low protein and fat content. This material possesses very little feeding value and it is believed to be an economic waste to transport such material from the cotton fields of the south to this part of the country. They certainly have no place in the feed calendar of the northern feeder.

Special attention is also called to seven samples taken from shipments made by E. P. Mueller, Chicago, Illinois. Two of these were found at Manistee. One was sold as "Flax Screenings" but proved to be "Flax-Plant By-Product," a material of very low feeding value. The other was sold as "Pea and Barley Feed" and examination showed it to be a mixture of buckwheat hulls, ground peas, barley and millet. Five samples of "Fine Ground Seed Screenings" were collected in various places all of which contained more fiber than guaranteed and all were below guarantee in protein. As these cases were interstate shipments all those on which sufficient evidence could be collected were referred to the U. S. Department of Agriculture. The experience of the inspectors in securing evidence in connection with these shipments emphasized very strongly the importance of keeping a file of all invoices, freight bills and other papers having a bearing on such transactions.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
COTTONSEED MEAL							
J. E. Bartlett Co., Jackson, Mich.							
B 5606	Farmer Brand Choice Cottonseed Meal	Bay City	{ G.* F.*	41.0 39.9	5.0 6.3	14.0 12.1	
B 5899	Farmer Brand Choice Cottonseed Meal	Washington		8.6	44.0	10.7	\$82.00
Average			8.4	42.2	8.2	11.4	
F. W. Brade & Co., Memphis, Tenn.							
B 5215	Farmer Brand Straight Cottonseed Meal	Ypsilanti	{ G.* F.*	36.0 35.5	5.0 7.3	17.0 13.3	75.00
B 5272	Farmer Brand Straight Cottonseed Meal	Milford		8.1	40.0	6.3	12.4
B 5318	Farmer Brand Straight Cottonseed Meal	Saline		8.6	36.7	7.4	11.7
B 5322	Farmer Brand Straight Cottonseed Meal	Wayne		7.2	37.5	7.6	13.4
B 5323	Farmer Brand Straight Cottonseed Meal	Wayne		7.1	36.8	7.2	15.9
B 5401	Farmer Brand Straight Cottonseed Meal	Farmington		7.1	36.4	7.5	13.0
B 5404	Farmer Brand Straight Cottonseed Meal	Novi		8.7	36.2	7.3	12.1
B 5408	Farmer Brand Straight Cottonseed Meal	Walled Lake		6.8	38.1	8.0	11.7
B 5452	Farmer Brand Straight Cottonseed Meal	Holland		8.5	35.4	7.9	13.7
B 5879	Farmer Brand Straight Cottonseed Meal	Pontiac		6.9	36.1	6.4	16.4
Average			7.7	36.9	7.3	13.4	
B 5440	Jay Brand Cottonseed Meal	South Haven	{ G.* F.*	36.0 36.7	5.0 6.3	14.0 13.3	4.25
B 5619	Jay Brand Cotton Seed Meal	Fairgrove		10.1	36.9	6.5	12.7
Average			10.0	36.8	6.4	13.0	
B 5612	Owl Brand High Grade Cottonseed Meal	Caro	{ G.* F.*	41.0 40.6	6.0 7.5	10.0 11.0	90.00
B 5622	Owl Brand High Grade Cottonseed Meal	Fairgrove		8.7	41.0	7.0	9.1
Average			8.5	40.8	7.3	10.1	
The Buckeye Cotton Oil Co., Cincinnati, Ohio.							
B 5148	Buckeye Good Cottonseed Meal	Holland	{ G.* F.*	36.0 35.0	5.0 5.6	14.0 13.1	80.00
B 5170	Buckeye Good Cottonseed Meal	Coloma		8.7	37.4	6.9	12.0
B 5182	Buckeye Good Cottonseed Meal	Fennville		7.9	41.7	8.4	9.4
B 5325	Buckeye Good Cottonseed Meal	Pinekey		7.3	40.3	7.7	9.5
B 5402	Buckeye Good Cottonseed Meal	Farmington		7.0	36.9	7.0	12.4
B 5407	Buckeye Good Cottonseed Meal	Novi		7.8	36.0	6.1	13.4
B 5421	Buckeye Good Cottonseed Meal	Traverse City		8.2	34.3	6.7	11.1
B 5476	Buckeye Good Cottonseed Meal	Kalamazoo		11.2	33.9	6.1	15.3
B 5533	Buckeye Good Cottonseed Meal	Albion		7.6	37.1	7.0	11.8
B 5610	Buckeye Good Cottonseed Meal	Bay City		8.4	35.8	7.2	14.9
B 5627	Buckeye Good Cottonseed Meal	Lapeer		8.9	35.6	7.8	14.6
B 5672	Buckeye Good Cottonseed Meal	Bad Axe		7.6	39.5	8.1	12.6
B 5762	Buckeye Good Cottonseed Meal	Niles		8.1	36.0	6.1	12.2
B 5850	Buckeye Good Cottonseed Meal	Trenton		8.6	36.5	7.1	13.8
B 5893	Buckeye Good Cottonseed Meal	Rochester		9.2	36.8	6.9	14.7
Average			8.4	36.8	7.0	12.7	
S. P. Davis, Little Rock, Ark.							
B 5320	Beauty Brand Cotton Seed Meal	Ypsilanti	{ G.* F.*	36.0 41.6	6.0 6.7	14.0 9.5	
B 5236	Good Luck Cotton Seed Meal	Petersburg	{ G.* F.*	41.0 40.8	6.0 6.8	9.0 9.9	3.00
Albert Dickinson Co., Chicago, Ill.							
B 5270	Dickinson Cottonseed Meal	Highland	{ G.* F.*	36.0 36.7	5.0 9.9	14.0 10.4	4.75
East St. Louis Cotton Oil Co., National Stock Yards, Ill.							
B 944	St. Clair Brand Cottonseed Meal	Wayne	{ G.* F.*	36.0 36.3	5.0 5.9	16.0 15.1	
B 946	St. Clair Brand Cottonseed Meal	Northville		9.6	37.9	6.0	12.0
B 5083	St. Clair Brand Cottonseed Meal	Tecumseh		8.4	36.1	7.1	13.2
B 5160	St. Clair Brand Cottonseed Meal	Coopersville		8.6	37.4	6.7	11.9
B 5225	St. Clair Brand Cottonseed Meal	Adrian		8.7	36.9	6.2	13.6
B 5248	St. Clair Brand Cottonseed Meal	Wayne		9.6	35.7	6.3	12.9
B 5274	St. Clair Brand Cottonseed Meal	Howell		9.2	36.2	6.2	12.5

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
East St. Louis Cotton Oil Co., National Stock Yards, Ill.—Con.							
B 5316	St. Clair Brand Cottonseed Meal	Jackson	8.7	37.1	6.4	13.0	\$4.00
B 5319	St. Clair Brand Cottonseed Meal	Saline	8.8	37.0	7.3	12.0	78.00
B 5321	St. Clair Brand Cottonseed Meal	Ypsilanti	9.0	37.3	6.5	11.9	4.15
B 5324	St. Clair Brand Cottonseed Meal	South Lyons	9.1	36.9	7.5	11.8	78.00
B 5438	St. Clair Brand Cottonseed Meal	Holland	8.5	36.4	6.1	12.8	4.25
B 5472	St. Clair Brand Cottonseed Meal	Kalamazoo	11.5	36.9	8.7	12.0	4.15
B 5543	St. Clair Brand Cottonseed Meal	Ann Arbor	9.0	37.4	6.3	12.0	3.90
B 5573	St. Clair Brand Cottonseed Meal	Flint	10.1	37.9	7.8	11.5	85.00
B 5585	St. Clair Brand Cottonseed Meal	Saginaw	8.6	36.7	6.5	14.6	4.30
B 5636	St. Clair Brand Cottonseed Meal	Adrian	7.8	37.8	7.0	13.8	4.10
B 5637	St. Clair Brand Cottonseed Meal	Adrian	8.7	36.4	7.1	13.8	4.10
B 5640	St. Clair Brand Cottonseed Meal	Adrian	7.5	37.2	7.1	13.8	4.10
B 5642	St. Clair Brand Cottonseed Meal	Hudson	9.7	37.3	6.6	12.4	4.80
B 5643	St. Clair Brand Cottonseed Meal	Hudson	10.0	37.5	6.8	11.8	4.50
B 5645	St. Clair Brand Cottonseed Meal	Hillsdale	8.4	37.5	6.8	12.1	80.00
B 5647	St. Clair Brand Cottonseed Meal	Jackson	10.0	36.8	6.2	13.9	4.10
B 5655	St. Clair Brand Cottonseed Meal	Morenci	8.8	36.4	6.8	13.6	4.00
B 5657	St. Clair Brand Cottonseed Meal	Monroe	10.2	38.4	6.5	13.0	84.00
B 5736	St. Clair Brand Cottonseed Meal	Battle Creek	7.7	38.4	6.2	13.0	4.25
B 5818	St. Clair Brand Cottonseed Meal	Detroit	8.5	37.8	6.8	13.6	82.00
B 5887	St. Clair Brand Cottonseed Meal	Birmingham	10.0	36.6	6.0	12.5	4.20
		Average	9.1	37.1	6.7	12.9	
B 5750	"38 Brand" Cottonseed Meal	Coopersville	{ G.* F.*	36.0 38.9	5.0 6.6	16.0 11.4	80.00
Hayes Grain & Commission Co., Little Rock, Ark.							
B 5291	Arkansaw Brand Cottonseed Meal	Vassar	{ G.* F.*	36.0 38.0	5.0 6.2	14.0 12.9	92.00
B 5292	Arkansaw Brand Cottonseed Meal	Mayville	8.0	37.7	6.0	12.5	80.00
B 5301	Arkansaw Brand Cottonseed Meal	Grand Ledge	9.1	32.7	5.5	16.7	
B 5535	Arkansaw Brand Cottonseed Meal	Albion	9.2	36.9	6.5	12.9	78.00
B 5536	Arkansaw Brand Cottonseed Meal	Albion	9.0	38.9	6.5	11.6	78.00
B 5539	Arkansaw Brand Cottonseed Meal	Grand Ledge	9.1	35.9	5.8	16.2	
B 5581	Arkansaw Brand Cottonseed Meal	Clio	8.6	38.9	6.3	12.9	84.00
B 5616	Arkansaw Brand Cottonseed Meal	Caro	7.8	37.8	6.8	13.0	82.00
B 5715	Arkansaw Brand Cottonseed Meal	Wayland	8.6	37.6	6.1	13.4	
		Average	8.6	37.2	6.2	13.5	
B 5783	Nutrine Brand Cottonseed Meal	Sturgis	{ G.* F.*	41.0 43.2	6.0 6.9	10.0 7.6	4.25
Humphreys-Godwin Co., Memphis, Tenn.							
B 5430	Danish Brand Cottonseed Meal	Cadillac	{ G.* F.*	36.0 35.9	5.0 5.7	15.0 14.9	82.00
B 5462	Danish Brand Cottonseed Meal	Lakeview	8.8	34.3	5.7	15.6	
B 5564	Danish Brand Cottonseed Meal	Lansing	9.3	38.4	7.4	10.2	82.00
B 5561	Danish Brand Cottonseed Meal	Coldwater	8.4	39.6	7.5	10.9	81.00
B 5677	Danish Brand Cottonseed Meal	Port Huron	8.1	36.3	6.4	14.1	80.00
B 5711	Danish Brand Cottonseed Meal	Allegan	8.9	35.7	6.6	15.6	4.00
B 5747	Danish Brand Cottonseed Meal	Belding	8.4	36.4	6.1	13.6	
		Average	8.5	36.7	6.5	13.6	
Imperial Cotto Sales Co., Chicago, Illinois							
B 5303	Imperial Cotto Cottonseed Meal	Mason	{ G.* F.*	36.0 37.8	5.0 7.5	14.0 11.4	3.75
B 5584	Imperial Cotto Cottonseed Meal	Lansing	8.6	35.5	5.5	14.6	4.50
B 5589	Imperial Cotto Cottonseed Meal	Saginaw	9.1	36.5	6.9	14.6	4.30
		Average	8.7	36.6	6.6	13.5	
Interstate Feed Association, Toledo, Ohio							
B 5898	Cottonseed Meal	Washington	{ G.* F.*	31.8 32.1	6.1 6.2	14.4 14.8	4.00

*Abbreviations for Guaranteed and Found.

MICHIGAN AGRICULTURAL COLLEGE

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton ton or owt.
L. B. Lovitt & Co., Memphis, Tenn.							
B 5409	"Lovitt Brand" Cottonseed Meal	Grand Ledge { G.* F.*	7.5	41.0 40.1	5.5 8.7	14.0 12.0	
(1919)							
B 5159	Thirty Six Brand Cottonseed Meal	Coopersville { G.* F.*	7.8	38.0 35.9	5.7 5.8	14.0 14.7	\$74.00
B 5436	Thirty Six Brand Cottonseed Meal	Coopersville	8.6	35.8	5.7	17.3	78.00
B 5446	Thirty Six Brand Cottonseed Meal	Grand Rapids	7.7	38.7	7.0	12.9	4.50
Average							
			8.0	36.8	6.2	15.0	
(1920)							
B 5860	Thirty Six Brand Cottonseed Meal	Jackson { G.* F.*	8.2	38.0 39.4	5.0 5.6	14.0 14.1	4.10
C. L. Montgomery & Co., Memphis, Tenn.							
B 5575	Star Brand Cottonseed Meal	Flint { G.* F.*	9.1	36.0 37.1	6.0 7.2	14.0 14.4	85.00
B 5582	Star Brand Cottonseed Meal	Clio	8.2	36.5	6.5	13.9	84.00
B 5869	Star Brand Cottonseed Meal	Adrian	7.8	38.4	7.0	11.8	4.10
Average							
			8.4	37.3	6.9	13.4	
W. C. Nothern, Little Rock, Ark.							
B 5620	Bee Brand Cottonseed Meal	Fairgrove { G.* F.*	9.6	41.0 41.1	6.0 7.6	12.0 10.9	88.00
Average							
			7.9	36.0 41.0	5.0 6.5	12.0 10.2	77.00
B 5295	Standard Brand Cottonseed Meal	Cass City { G.* F.*	7.9	41.0	6.5	10.2	82.00
B 5583	Standard Brand Cottonseed Meal	Birch Run	8.4	36.6	6.2	14.0	82.00
B 5624	Standard Brand Cottonseed Meal	Bad Axe	9.5	31.4	5.2	17.1	80.00
B 5632	Standard Brand Cottonseed Meal	Tecumseh	7.2	40.1	7.0	11.1	80.00
B 5684	Standard Brand Cottonseed Meal	Port Huron	8.5	35.8	6.3	15.4	82.00
Average							
			8.3	37.0	6.2	13.6	
Rosenbaum Bros., Chicago, Ill.							
B 5253	Cottonseed Meal	Owosso { G.* F.*	9.1	36.0 35.6	5.0 6.2	14.0 13.0	80.00
Arnold A. Thurman Grain & Feed Co., St. Louis, Mo.							
B 5567	Cottonseed Meal	Lansing { G.* F.*	8.3	36.0 38.8	7.6 9.3	9.3	60.00
Union Seed & Fertilizer Co., New York City, N. Y.							
B 5460	Surety Brand Cottonseed Meal	Big Rapids { G.* F.*	8.4	36.0 40.4	5.5 7.7	14.0 10.8	
B 5591	Surety Brand Cottonseed Meal	Saginaw	9.0	37.8	6.8	12.5	82.00
B 5614	Surety Brand Cottonseed Meal	Caro	8.0	38.5	6.7	13.2	
B 5633	Surety Brand Cottonseed Meal	Tecumseh	7.7	35.8	5.9	14.8	80.00
B 5650	Surety Brand Cottonseed Meal	Blissfield	8.1	37.7	7.3	11.5	4.00
B 5702	Surety Brand Cottonseed Meal	Coopersville	10.1	38.9	8.4	11.4	
B 5788	Surety Brand Cottonseed Meal	Marcellus	8.6	37.6	6.5	13.6	80.00
B 5804	Surety Brand Cottonseed Meal	Detroit	9.2	37.4	7.1	13.9	82.00
B 1358	Surety Brand Cottonseed Meal	Grand Rapids	8.9	37.1	6.6	14.1	76.00
Average							
			8.1	37.9	7.0	12.9	
(1920)							
B 5607	Yellow Tag Cottonseed Meal	Bay City { G.* F.*	7.7	41.0 44.0	7.0 7.4	10.0 11.1	4.50
Wagner White Co., Inc., Jackson, Mich.							
B 1335	Waw-Co Cottonseed Meal	Caledonia { G.* F.*	8.6	35.9 35.9	5.4 5.4	16.1 16.1	80.00
B 5411	Waw-Co Cottonseed Meal	Clinton	8.0	37.8	7.8	10.7	75.00
B 5630	Waw-Co Cottonseed Meal	Parma	8.7	35.5	5.9	16.7	75.00
B 5662	Waw-Co Cottonseed Meal	Mason	9.2	33.2	5.7	18.4	78.00
B 5699	Waw-Co Cottonseed Meal	Plymouth	8.9	40.2	8.2	8.8	
B 5741	Waw-Co Cottonseed Meal	Eaton Rapids	8.2	34.5	5.8	17.1	50.00
B 5742	Waw-Co Cottonseed Meal	Parma	8.6	39.1	8.5	12.4	
B 5754	Waw-Co Cottonseed Meal	Charlotte	8.9	39.5	9.6	9.6	
B 5760	Waw-Co Cottonseed Meal	Three Oaks	9.9	37.5	8.1	12.0	
Average							
			8.8	37.0	7.2	13.5	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

23

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fat.	Price per ton or cwt.
E. L. Wellman Co., Grand Rapids, Mich.							
B 5463	Feeders Favorite Cottonseed Meal.....	Alma..... { G.*	9.1	36.7	6.6	13.6	\$4.40
B 5864	Feeders Favorite Cottonseed Meal.....	Albion..... { F.*	8.7	36.5	7.4	13.6	84.00
		Average.....	8.9	36.6	7.0	13.6	
COTTONSEED FEED							
Humphreys Godwin Co., Memphis, Tenn.							
B 5147	77 Cottonseed Feed.....	Grand Rapids..... { G.*	11.1	18.9	3.2	26.6	65.00
B 5304	77 Cottonseed Feed.....	Jackson..... { F.*	11.2	19.1	3.5	25.3	65.00
B 5412	77 Cottonseed Feed.....	Clinton.....	12.2	19.1	3.4	23.4	65.00
B 5448	77 Cottonseed Feed.....	Grand Rapids.....	11.7	17.8	3.5	24.0	3.40
B 5583	77 Cottonseed Feed.....	Centerville.....	10.8	20.5	3.8	23.5	
B 5654	77 Cottonseed Feed.....	Morenci.....	12.1	19.8	3.0	23.7	66.00
B 5704	77 Cottonseed Feed.....	Coopersville.....	11.6	19.8	3.3	24.0	
B 1340	77 Cottonseed Feed.....	Sparta.....	8.5	21.4	4.1	23.8	64.00
		Average.....	10.3	19.6	3.5	24.3	
LINSEED MEAL							
American Linseed Co., Chicago, Ill.							
B 1355	Old Process Linseed Oil Meal.....	Coopersville..... { G.*	10.2	32.1	6.5	8.1	
B 5168	Old Process Linseed Oil Meal.....	St. Joseph..... { F.*	8.9	35.6	6.6	7.9	88.00
B 5370	Old Process Linseed Oil Meal.....	Iron Mountain.....	7.9	34.5	6.8	13.7	4.75
B 5532	Old Process Linseed Oil Meal.....	Parma.....	9.5	34.6	6.2	7.6	85.00
B 5537	Old Process Linseed Oil Meal.....	Albion.....	8.6	36.4	6.6	7.6	85.00
		Average.....	9.0	34.6	6.5	9.0	
American Milling Co., Peoria, Ill.							
B 1328	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Hastings..... { G.*	10.9	31.6	6.6	8.5	5.00
B 5194	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Belmont..... { F.*	8.3	31.1	6.5	9.2	82.00
B 5200	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Petoakey.....	10.0	30.5	6.7	9.5	4.50
B 5450	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Grand Rapids.....	9.1	29.9	7.5	9.9	4.30
B 5534	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed.....	Albion.....	8.9	31.0	6.7	8.9	4.25
		Average.....	9.4	30.8	6.8	9.2	
Archer Daniels Linseed Co., Minneapolis, Minn.							
B 5171	Old Process Oil Meal.....	Coloma..... { G.*	8.8	32.8	8.0	7.8	85.00
B 5199	Old Process Oil Meal.....	Petoakey..... { F.*	10.2	30.5	7.3	8.1	88.00
B 5334	Old Process Oil Meal.....	Cheboygan.....	8.7	32.2	7.0	9.8	4.50
B 5518	Old Process Oil Meal.....	Marquette.....	8.8	32.3	5.6	9.1	4.45
B 5634	Old Process Oil Meal.....	Tecumseh.....	9.1	32.2	7.2	7.9	4.30
		Average.....	9.1	32.0	7.0	8.5	
Wm. O. Goodrich Co., Milwaukee, Wis.							
B 4691	Ground Linseed Cake.....	Grand Rapids..... { G.*	9.7	33.4	6.4	8.2	80.20
B 5459	Ground Linseed Cake.....	Big Rapids..... { F.*	9.5	34.1	6.7	9.0	4.25
B 5563	Ground Linseed Cake.....	Lansing.....	9.9	35.6	6.0	7.4	88.00
B 5714	Ground Linseed Cake.....	Wayland.....	9.8	31.7	6.5	7.8	
		Average.....	9.7	33.7	6.4	8.1	
Hirst & Begley Linseed Co., Chicago, Ill.							
B 4653	Linseed Oil Meal.....	Coopersville..... { G.*	10.6	32.4	6.2	12.8	88.00
B 4673	Linseed Oil Meal.....	Hudsonville..... { F.*	10.3	31.7	7.2	7.8	85.00
B 4793	Linseed Oil Meal.....	Eaton Rapids.....	9.7	33.3	5.6	8.2	
B 5018	Linseed Oil Meal.....	Bronson.....	9.8	32.6	6.5	8.4	4.75
B 5027	Linseed Oil Meal.....	Coldwater.....	9.4	32.6	6.5	8.2	4.50
B 5429	Linseed Oil Meal.....	Cadillac.....	9.9	31.4	6.4	8.1	88.00
B 5447	Linseed Oil Meal.....	Grand Rapids.....	9.3	31.9	6.6	8.8	4.50
B 5453	Linseed Oil Meal.....	Holland.....	9.2	31.3	6.5	8.3	4.55
B 5716	Linseed Oil Meal.....	Wayland.....	9.4	31.1	6.3	8.2	
		Average.....	9.7	32.0	6.4	8.8	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Spencer Kellogg & Sons, Inc., Buffalo, New York.						
B 1332	Old Process Oil Meal.....	(1920) Comstock Park.. { G.*	9.1	32.0	5.0	10.0	34.50
B 1337	Old Process Oil Meal.....	Sparta..... { F.*	10.7	31.7	6.0	7.8	34.00
		Average.....	9.9	31.7	6.0	7.9	
		(1919) { G.*		33.0	5.0	10.0	
B 4671	Old Process Oil Meal.....	Hudsonville..... { F.*	10.5	31.0	6.0	8.0	35.00
B 5557	Old Process Oil Meal.....	Lansing.....	9.4	34.8	5.8	8.3	5.00
B 5601	Old Process Oil Meal.....	Hudsonville.....	8.5	31.3	5.6	8.2	
B 5602	Old Process Oil Meal.....	Holland.....	9.6	30.9	6.0	8.1	
B 5744	Old Process Oil Meal.....	Greenville.....	9.0	32.0	6.2	8.8	
		Average.....	9.4	32.0	5.9	8.3	
	Metzger Seed & Oil Co., Toledo, Ohio						
B 5034	Old Process Oil Meal.....	St. Johns..... { G.*	9.5	32.0	5.0	10.0	4.50
B 5257	Old Process Oil Meal.....	Owosso..... { F.*	10.3	34.8	6.2	8.1	5.50
		Average.....	9.9	35.2	6.2	8.0	
	Midland Linseed Products Co., Minneapolis, Minn.						
B 5038	Midland Brand Pure Old Process Ground Linseed Cake.....	Williamston..... { G.*	9.6	32.0	5.0	9.5	
B 5414	Midland Brand Pure Old Process Ground Linseed Cake.....	Scottville..... { F.*	8.9	33.7	7.8	8.5	4.00
B 5434	Midland Brand Pure Old Process Ground Linseed Cake.....	Cadillac.....	8.3	30.9	9.1	8.5	88.00
B 5574	Midland Brand Pure Old Process Ground Linseed Cake.....	Flint.....	9.6	32.2	7.1	7.9	89.00
B 5586	Midland Brand Pure Old Process Ground Linseed Cake.....	Saginaw.....	9.7	34.6	7.6	9.2	4.50
B 5617	Midland Brand Pure Old Process Ground Linseed Cake.....	Caro.....	9.6	30.7	7.3	8.1	5.00
B 5658	Midland Brand Pure Old Process Ground Linseed Cake.....	Monroe.....	9.7	29.9	8.8	8.2	85.00
B 5867	Midland Brand Pure Old Process Ground Linseed Cake.....	Adrian.....	9.4	35.2	6.7	7.8	4.40
B 5877	Midland Brand Pure Old Process Ground Linseed Cake.....	Pontiac.....	8.5	31.4	7.5	8.1	4.75
		Average.....	9.3	32.7	7.8	8.2	
	Minnesota Linseed Oil Co., Minneapolis, Minn.						
B 5377	Ground Linseed Cake.....	Iron Mountain.. { G.*	9.6	34.0	5.0	11.0	
		{ F.*		35.3	6.4	8.6	
	Northern Linseed Oil Co., Minneapolis, Minn.						
B 5392	Ground Linseed Cake.....	Ironwood..... { G.*	8.5	33.0	6.0	9.0	
		{ F.*		35.8	6.9	8.3	4.35
	Sherwin Williams Co., Cleveland, Ohio.						
		(1919) { G.*		33.0	5.0	8.0	
B 5191	S. W. C. Linseed Oil Meal.....	Grand Rapids..... { F.*	7.9	37.1	6.4	7.8	
B 5223	S. W. C. Linseed Oil Meal.....	Adrian.....	8.7	36.9	6.5	8.0	4.10
B 5277	S. W. C. Linseed Oil Meal.....	Howell.....	9.5	36.9	6.2	7.5	4.50
B 5718	S. W. C. Linseed Oil Meal.....	Wayland.....	8.6	36.8	7.0	7.9	
B 5787	S. W. C. Linseed Oil Meal.....	Schoolcraft.....	9.8	34.9	6.6	8.3	5.00
B 5862	S. W. C. Linseed Oil Meal.....	Jackson.....	8.7	33.3	6.6	8.1	4.00
		Average.....	8.9	36.0	6.6	7.9	
		(1920) { G.*		30.0	5.0	9.0	
B 5786	S. W. C. Linseed Oil Meal.....	Constantine..... { F.*	8.6	33.1	7.0	8.3	
B 5874	S. W. C. Linseed Oil Meal.....	Adrian.....	8.0	32.6	6.9	9.0	4.40
		Average.....	8.3	32.9	7.0	8.7	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Toledo Seed & Oil Co., Toledo, Ohio.							
B 1334	Major Brand Old Process Oil Meal.....	Caledonia..... { G.*	9.9	33.0	6.0	10.0	85.00
B 4679	Major Brand Old Process Oil Meal.....	Jamestown..... { F.*	9.8	32.2	6.2	8.4	85.00
B 5087	Major Brand Old Process Oil Meal.....	Saline.....	9.4	31.4	6.7	8.2	4.25
B 5139	Major Brand Old Process Oil Meal.....	Zeeland.....	11.1	32.3	6.7	10.6	85.00
B 5209	Major Brand Old Process Oil Meal.....	Ann Arbor.....	9.5	32.4	6.9	10.3	84.00
B 5464	Major Brand Old Process Oil Meal.....	Ithaca.....	11.3	31.8	6.6	8.7	4.50
B 5470	Major Brand Old Process Oil Meal.....	Mt. Pleasant.....	7.9	31.2	6.3	3.3	4.35
B 5478	Major Brand Old Process Oil Meal.....	Kalamasoo.....	11.0	33.3	6.5	8.3	78.00
B 5494	Major Brand Old Process Oil Meal.....	Plainwell.....	10.6	32.9	7.2	9.3	81.00
B 5579	Major Brand Old Process Oil Meal.....	Flint.....	9.8	31.5	6.1	8.7	4.50
B 5697	Major Brand Old Process Oil Meal.....	Detroit.....	10.3	32.0	6.3	8.9	81.00
B 5703	Major Brand Old Process Oil Meal.....	Coopersville.....	9.2	31.0	6.8	8.4	4.50
B 5733	Major Brand Old Process Oil Meal.....	Battle Creek.....	9.5	32.8	6.8	8.3	2.40
B 5752	Major Brand Old Process Oil Meal.....	Charlotte.....	9.7	31.6	6.7	8.1	84.00
B 5817	Major Brand Old Process Oil Meal.....	Detroit.....	9.7	32.4	7.3	8.6	84.00
		Average.....	9.9	32.0	6.7	8.4	
DRIED MALT GRAINS.							
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 4602	Malt Feed.....	Grand Rapids..... { G.*	7.5	26.0	5.2	12.5	60.00
B 5726	Malt Feed.....	Battle Creek..... { F.*	8.2	31.1	5.5	10.2	62.00
		Average.....	7.9	31.5	6.8	9.8	
Quaker Oats Co., Chicago, Ill.							
B 5738	Dried Malt By-Product.....	Battle Creek..... { G.*	6.3	18.0	5.0	14.0	55.00
		Battle Creek..... { F.*	6.3	21.0	5.9	11.6	
CORN GLUTEN FEED.							
Corn Products Refining Co., New York, N. Y.							
B 5006	Buffalo Corn Gluten Feed.....	Albion..... { G.*	9.2	24.8	2.4	7.4	65.00
B 5089	Buffalo Corn Gluten Feed.....	Jackson..... { F.*	9.0	23.8	2.9	9.0	3.60
B 5479	Buffalo Corn Gluten Feed.....	Kalamasoo.....	10.5	28.7	2.3	7.1	
B 5555	Buffalo Corn Gluten Feed.....	Lansing.....	9.0	25.3	4.4	7.4	3.50
B 5763	Buffalo Corn Gluten Feed.....	Niles.....	11.2	25.4	3.8	8.0	
		Average.....	9.8	25.6	3.2	7.8	
Douglas Company, Cedar Rapids, Ia.							
B 5520	Douglas Corn Gluten Feed.....	Munising..... { G.*	9.6	23.0	1.0	8.0	4.00
		Munising..... { F.*	9.6	24.1	3.0	7.1	
J. C. Hubinger Bros., Keokuk, Iowa.							
B 5184	KKK Corn Gluten Feed.....	Grand Haven..... { G.*	8.6	23.0	2.4	7.5	80.00
B 5211	KKK Corn Gluten Feed.....	Ypsilanti..... { F.*	8.9	22.4	3.9	6.9	3.55
		Average.....	8.8	21.5	4.0	6.7	
Huron Milling Co., Harbor Beach, Mich.							
B 5298	Jenks Corn Gluten Feed.....	Harbor Beach..... { G.*	7.5	22.0	3.0	8.0	3.50
B 5331	Jenks Corn Gluten Feed.....	Alpena..... { F.*	7.1	21.5	4.3	7.6	75.00
		Average.....	7.3	21.7	4.3	7.5	
MALT PROCESS GLUTEN.							
J. E. Bartlett Co., Jackson, Mich.							
B 5669	Malt Process Gluten Feed.....	Adrian..... { G.*	6.7	31.5	10.8	6.4	
		Adrian..... { F.*	6.7	31.5	10.9	6.4	
Wagner-White Co., Inc., Jackson, Mich.							
B 5631	Wawoo Gluten Feed.....	Parma..... { G.*	6.3	26.0	8.0	10.0	78.00
B 5667	Wawoo Gluten Feed.....	Parma..... { F.*	5.7	17.8	10.6	7.5	
		Parma.....	5.7	18.1	9.4	6.7	
		Average.....	6.0	18.0	10.0	7.1	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
HOMINY FEED.							
American Hominy Co., Indianapolis, Ind.							
B 5572	Homco Hominy Feed.....	Flint..... { G.* F.*	9.9	10.0 10.7	6.0 6.4	6.0 4.4	89.00
Cereal Mills Co., Wausau, Wis.							
B 5382	Hominy Feed.....	Crystal Falls..... { G.* F.*	10.3	10.0 10.6	7.0 7.2	4.0 4.2	
Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
B 5724	B. C. White Hominy Feed.....	Battle Creek..... { G.* F.*	10.4	10.0 10.1	6.0 7.4	5.0 4.1	50.00
Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 1345	Badger Hominy Feed.....	Sparta..... { G.* F.*	9.9	10.0 10.7	6.0 6.5	5.0 4.5	3.25
B 5005	Badger Hominy Feed.....	Albion.....	11.4	11.1	5.8	3.6	66.00
B 5822	Badger Hominy Feed.....	Detroit.....	10.7	11.6	6.9	4.5	70.00
Postum Cereal Co., Battle Creek, Mich.							
	Average.....		10.7	11.1	6.4	4.2	
B 5722	Burt's Hominy Feed.....	Battle Creek..... { G.* F.*	9.5	10.0 11.0	6.0 7.0	5.0 3.9	61.00
CORN GERM MEAL.							
Clinton Sugar Refining Co., Clinton, Iowa.							
B 961	Clinton Corn Germ Meal.....	Montgomery..... { G.* F.*	8.3	20.0 23.0	7.0 9.7	12.0 9.1	80.00
Corn Products Refining Co., New York City, N. Y.							
B 5241	Diamond Hog Meal.....	Wayne..... { G.* F.*	8.4	18.0 24.0	7.0 10.8	13.0 8.9	3.75
B 5768	Diamond Hog Meal.....	Niles.....	9.8	25.6	8.0	8.8	
CORN FEED MEAL.							
Amendt Milling Co., Monroe, Mich.							
B 5057	Amco Corn Feed Meal.....	Norvell..... { G.* F.*	11.6	8.5 9.8	2.5 4.4	6.5 3.1	3.75
F. Becker, Grand Rapids, Mich.							
B 4694	Feed Corn Meal.....	Grand Rapids... { G.* F.*	13.2	9.0 9.1	4.0 3.7	9.0 2.0	
Commercial Milling Co., Detroit, Mich.							
B 5696	Henkels Coarse Feed Corn Meal.....	Detroit..... { G.* F.*	12.7	8.5 9.8	4.0 6.0	2.0 1.5	3.50
B 5814	Henkels Coarse Feed Corn Meal.....	Detroit.....	13.8	8.8	4.3	1.2	
Darrah Milling Co., Big Rapids, Mich.							
	Average.....		13.3	9.3	5.2	1.4	
B 5458	Unbolted Corn Meal.....	Big Rapids..... { G.* F.*	13.8	9.0 9.8	4.0 3.5	3.5 1.6	3.25
Hankey Milling Co., Petoskey, Mich.							
B 5197	Corn Feed Meal.....	Petoskey..... { G.* F.*	13.3	9.7 9.2	5.3 4.2	3.4 2.5	63.00
King Milling Co., Lowell, Mich.							
B 5774	King Corn Meal.....	Lowell..... { G.* F.*	13.5	8.6 8.5	3.6 4.0	1.4 1.8	62.00
Saginaw Milling Co., Saginaw, Mich.							
B 5593	Corn Feed Meal.....	Saginaw..... { G.* F.*	12.6	10.0 10.7	6.0 5.9	7.0 3.1	60.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	David Stott Milling Co., Detroit, Mich.						
B 5849	Yellow Corn Feed Meal.....	Detroit.....	{ G. ^o F. ^o	8.5 11.7	3.5 10.4	4.0 2.5	84.00
	Watson Higgins Milling Co., Grand Rapids, Mich.						
B 5141	Corn Feed Meal.....	Grand Rapids...	{ G. ^o F. ^o	9.5 12.5	5.0 9.6	3.0 3.6	50.00
	ANIMAL BY-PRODUCTS.						
	Chicago Feed & Fertilizer Co., Chicago, Ill.						
B 5112	Magic Brand Meat Scraps.....	Muskegon.....	{ G. ^o F. ^o	50.0 7.8	6.0 52.8	3.0 9.0	5.75
B 5644	Magic Brand Digester Tankage.....	Hudson.....	{ G. ^o F. ^o	60.0 6.8	2.0 55.0	3.0 2.1	3.7
B 5668	Magic Brand Digester Tankage.....	Hudson.....	{ G. ^o F. ^o	6.8 57.1	6.3 3.2	3.2	
	Darling & Company, Chicago, Ill.						
B 1342	Darling's 60% Digester Tankage.....	Sparta.....	{ G. ^o F. ^o	60.0 10.9	0.5 61.7	3.0 6.0	1.7
B 4650	Darling's Feeding Tankage (40%).....	Sparta.....	{ G. ^o F. ^o	40.0 6.5	0.5 51.0	5.0 5.2	2.8
B 5082	Darling's Feeding Tankage (40%).....	Tecumseh.....	{ G. ^o F. ^o	11.8 55.8	1.5 3.4	3.4	4.85 4.50
		Average.....		9.2	53.4	3.3	3.1
B 4695	Darling's Meat Scraps for Poultry.....	Grand Rapids.....	{ G. ^o F. ^o	50.0 8.0	0.5 46.8	3.0 11.2	2.5
B 4789	Darling's Meat Scraps for Poultry.....	Eaton Rapids.....	{ G. ^o F. ^o	7.1 53.1	10.4 2.4	2.4	6.50
B 5012	Darling's Meat Scraps for Poultry.....	Union City.....	{ G. ^o F. ^o	8.9 53.2	8.9	1.7	
		Average.....		8.0	51.1	10.2	2.2
B 4684	Hartman Tankage Works, Grand Rapids, Mich. Tankage.....	Grand Rapids...	{ G. ^o F. ^o	49.8 11.9	9.8 60.4	0.8 16.8	0.7
	H. P. Klee, Holland, Mich.						
B 4657	Tankage.....	Holland.....	{ G. ^o F. ^o	45.0 5.9	10.0 39.8	0.5 14.2	0.8
	Millenbach Bros., Detroit, Mich.						
B 5838	Millenbach's Mixed Beef Scraps.....	Detroit.....	{ G. ^o F. ^o	45.0 7.1	10.0 49.3	3.0 10.9	2.1
	J. L. & H. Stadler, Cleveland, Ohio.						
B 5066	Stadler's Digester Tankage.....	Montgomery.....	{ G. ^o F. ^o	60.0 11.9	3.0 60.2	3.0 7.0	1.3
B 5635	Stadler's Digester Tankage.....	Tecumseh.....	{ G. ^o F. ^o	10.3 60.3	6.2 2.3	2.3	6.00
B 5638	Stadler's Digester Tankage.....	Adrian.....	{ G. ^o F. ^o	11.7 59.8	5.7 5.7	1.5 1.5	5.75
B 5757	Stadler's Digester Tankage.....	Decatur.....	{ G. ^o F. ^o	11.4 61.8	4.3 2.3	2.3	
		Average.....		11.3	60.5	5.8	1.9
B 4794	Swift's Digester Tankage.....	Eaton Rapids.....	{ G. ^o F. ^o	60.0 7.6	5.0 59.7	3.0 7.2	1.5
B 5069	Swift's Digester Tankage.....	Montgomery.....	{ G. ^o F. ^o	7.4 61.7	7.3 1.1	1.1	6.65
B 5224	Swift's Digester Tankage.....	Adrian.....	{ G. ^o F. ^o	8.4 63.8	5.4 1.2	1.2	5.75
		Average.....		7.8	61.7	6.6	1.3
B 5875	Swift's Poultry Bone.....	Adrian.....	{ G. ^o F. ^o	25.0 8.0	2.0 25.1	3.0 2.7	1.3
	Syracuse Rendering Co., Syracuse, N. Y.						
B 5810	Cooked Meat & Bone Scraps.....	Detroit.....	{ G. ^o F. ^o	40.0 6.5	8.0 45.2	2.1	6.00
	S. I. Treat & Son, Coldwater, Mich.						
B 5064	Old Hoss Tankage.....	Reading.....	{ G. ^o F. ^o	53.0 4.5	17.4 43.3	0.7 1.2	4.25

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	ALFALFA MEAL AND ALFALFA WITH MOLASSES.						
	Arcady Farms Milling Co., Chicago, Ill.						
B 5086	Alfalfa and Molasses Feed	Saline..... { G.*	11.0	1.0	20.0		
B 5208	Alfalfa and Molasses Feed	Ann Arbor..... { F.*	18.3	8.7	0.9	16.8	23.50
B 5258	Alfalfa and Molasses Feed	Owosso.....	15.2	7.9	1.3	21.9	52.00
B 5544	Alfalfa and Molasses Feed	Owosso.....	12.8	9.0	1.1	20.5	52.00
B 5546	Alfalfa and Molasses Feed	Ann Arbor.....	12.9	8.6	1.4	23.1	52.00
		Owosso.....	21.1	8.5	1.3	21.6	52.00
	Denver Alfalfa Milling & Produce Co., Hartman, Colorado.	Average.....	16.1	8.5	1.2	20.8	
B 5442	Alfalfa Meal	Holland..... { G.*	12.0	1.5	35.0		
		..... { F.*	8.0	16.1	1.8	26.9	2.58
	Grain Belt Mills Co., So. St. Joseph, Mo.						
B 5260	Greenleaf Alfalfa & Molasses Feed	Bancroft..... { G.*	10.0	0.7	26.0		
		..... { F.*	18.9	9.1	0.7	17.1	2.50
	Hales & Edwards Co., Chicago, Ill.						
B 5074	Red Comb Alfalfa Meal	Hudson..... { G.*	13.5	1.0	35.0		
		..... { F.*	8.6	13.1	1.8	31.0	2.75
	McMillan Co., Fort Wayne, Indiana.						
B 5639	Wayne Alfalfa and Molasses Feed	Adrian..... { G.*	8.4	0.8	18.0		
		..... { F.*	17.0	10.6	1.2	19.9	2.50
	Rosenbaum Bros., Chicago, Ill.						
B 4696	Alfalfa Meal, Vitality	Grand Rapids... { G.*	12.0	1.0	35.0		
		..... { F.*	10.2	13.3	0.9	36.5	46.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
CALF MEAL.								
Arady Farms Milling Co., Chicago, Ill.								
B 5070	Arady Calf Meal	{ G* F* }	{ 9.3 9.3 9.2 }	{ 55.0 55.4 54.8 }	{ 5.0 5.9 3.1 }	{ 7.0 5.6 5.4 }	{ \$1.40 93.00 1.05 }	Cottonseed meal, malt flour, linseed meal, wheat flour, powdered milk, oat meal, salt. Same as B 5070 without malt flour. Same as B 5049.
B 5449	Arady Calf Meal							
B 5734	Arady Calf Meal							
J. E. Bartlett Co., Jackson, Mich.								
B 5312	Bartlett's Calf Meal	{ G* F* }	{ 9.1 9.1 }	{ 51.0 22.6 }	{ 5.0 2.7 }	{ 4.0 3.9 }	.....	Cottonseed meal, linseed meal, blood flour, cooked wheat by-product, cooked corn by-product, cooked barley by-product, salt, sugar. Same as B 5312.
B 5328	Bartlett's Calf Meal							
Blatchford Calf Meal Factory, Waukegan, Ill.								
B 5013	Blatchford's Calf Meal	{ G* F* }	{ 9.9 9.9 10.4 10.1 }	{ 54.0 24.8 24.6 25.2 }	{ 5.0 5.4 4.9 5.1 }	{ 0.7 6.9 7.2 7.2 }	{ 1.00 6.00 5.40 }	Cottonseed meal, linseed meal, malt sprouts, barley meal, locust bean meal, beans, peas, flaxseed, rice polish, cocoashell meal, coconut meal, blood meal, wheat flour, fenuargreek, anise, salt, dried milk. Same as B 5013. Same as B 5013 without coconut meal and blood meal.
B 5045	Blatchford's Calf Meal							
B 5559	Blatchford's Calf Meal							
B 5559	Blatchford's Calf Meal							
Dodge Hooker Mills, Wausau, Wis.								
B 5354	Wisconsin Calf Meal	{ G* F* }	{ 10.6 10.6 }	{ 55.0 22.8 }	{ 5.0 4.9 }	{ 6.0 5.3 }	{ 1.05 }	Cottonseed meal, linseed meal, peas, flaxseed, blood meal, wheat flour, corn hearts flour, salt.
B 5154	Red Horn Calf Meal							
B 5547	Red Horn Calf Meal	{ G* F* }	{ 12.5 12.5 }	{ 18.0 15.7 }	{ 5.0 5.0 }	{ 6.0 4.3 }	{ 5.75 }	Linseed meal, dried buttermilk, alfalfa, leaf flour, red dog flour, oat flour, corn flour, barley flour, salt, dextrose, 1% calcium carbonate. Same as B 5154 without salt, dextrose, calcium carbonate and with corn meal.
B 5547	Red Horn Calf Meal							
B 5547	Red Horn Calf Meal							
International Stock Food Co., Minneapolis, Minn.								
B 5762	Grofast Calf Meal	{ G* F* }	{ 9.0 9.0 }	{ 55.0 27.0 }	{ 5.0 5.4 }	{ 10.0 8.6 }	{ 1.40 }	Linseed meal, locust bean meal, red dog flour, cleaned grain screenings, fenuargreek.
B 5778	Lamprey Products Co., St. Paul, Minn.							
B 5778	Lamprey Calf Meal	{ G* F* }	{ 9.9 9.9 }	{ 55.0 22.1 }	{ 5.0 3.6 }	{ 10.0 4.9 }	{ }	Cottonseed meal, linseed meal, gluten meal, locust bean meal, blood meal, oat meal, corn meal, fenuargreek, rye middlings, charcoal, salt.
B 5778	Lamprey Calf Meal							

*Abbreviations for Guaranteed and Found.

MICHIGAN AGRICULTURAL COLLEGE

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5015	J. D. Martin & Co., Mineral Point, Wis. Martin's Calf Feed.	Union City..... { G.* F.*	..... 9.6	26.0 22.8	6.0 6.0	10.0 6.5	..... \$1.35	Cottonseed meal, linseed meal, hominy feed, flaxseed, cocoanut meal, blood meal, wheat flour, oat meal, corn meal, fenugreek, charcoal, salt.
B 5361	National Calf Feed Co., Fond du Lac, Wis. National No Milk Calf Food.	Stephensboro..... { G.* F.*	..... 10.8	17.5 18.9	5.0 6.1	6.0 4.7	..... 6.50	Product from O. P. Oil Meal, wheat middlings, linseed, ginger, fenugreek, anise, charcoal, salt, gentian, sugar, sulfur.
B 5276	Quaker Oats Co., Chicago, Ill. Shumacher Calf Meal	Howell..... { G.* F.*	..... 8.9	18.0 19.6	8.0 7.7	4.0 2.3	..... 1.35	Linseed meal, flaxseed, blood meal, wheat meal, milk albumen, bicarbonate of soda, oat meal.
B 5613	Shumacher Calf Meal.	Caro..... { G.* F.*	..... 7.7	19.9 8.5	8.1 8.5	2.4	1.50	Same as B 5276.
B 4700	Ryde & Company, Chicago, Ill. Rydes Cream Calf Meal.	Average..... { G.* F.*	..... 8.3	19.8 25.0	8.1 5.0	2.4 6.0	..... 1.20	Cottonseed meal, hominy feed, locust bean meal, ground flaxseed, cocoashell meal, blood flour, wheat flour, beans and lentils, fenugreek, anise, salt.
B 4788	Rydes Cream Calf Meal.	Grand Rapids..... Eaton Rapids..... { G.* F.*	..... 11.3	24.3 24.5	4.8 5.1	7.8 8.2	1.35	Same as B 4700.
B 5014	Security Food Company, Minneapolis, Minn. Security Food Compound.	Average..... { G.* F.*	..... 10.3	24.4 9.8	5.0 4.5	8.0 6.0	..... 2.50	Locust bean meal, wheat flour, wheat middlings, corn starch, corn flour, fenugreek, anise, salt, sugar, iron oxide.
B 5040	Security Food Compound.	Union City..... Stockbridge..... Allegan..... { G.* F.*	..... 9.1	15.6 16.1	4.5 4.8	5.6 5.0	..... 5.00	Same as B 5014 with ginger, sodium chloride, powdered milk.
B 5710	Security Food Compound.	Average..... { G.* F.*	..... 9.5	15.6 15.8	4.8 4.7	6.7 5.8	2.25	Same as B 5040 without ginger.
B 5002	F. I. Williams & Son, North Adams, Mich. Williams Calf Meal.	Average..... North Adams..... { G.* F.*	..... 9.0	18.0 24.9	5.5 2.7	7.0 2.9	..... 5.00	Linseed meal, blood flour, corn flakes, anise.
HOG FEEDS.								
B 5028	Arcady Farms Milling Co., Chicago, Ill. Arcady Hog Meal and Humus.	Coldwater..... { G.* F.*	..... 10.4	18.0 16.4	5.0 4.2	10.0 8.2	..... 3.50	Linseed meal, gluten feed, wheat middlings, corn feed meal, digester tankage, humus, molasses, screenings, salt.
B 5061	Arcady Hog Meal and Humus.	Brooklyn..... Ann Arbor..... Kalamazoo..... Ann Arbor..... { G.* F.*	..... 8.8	17.6 18.6	4.3 4.0	8.2 6.5	..... 3.50	Same as B 5028 with corn oil cake.
B 5207	Arcady Hog Meal and Humus.	Ann Arbor..... Kalamazoo..... Ann Arbor..... { G.* F.*	..... 10.3	18.6 18.5	4.0 4.5	6.5 8.3	..... 3.00	Same as B 5028.
B 5477	Arcady Hog Meal and Humus.	Average..... { G.* F.*	..... 9.6	18.6 18.3	4.5 4.0	8.3 6.5	..... 3.00	Same as B 5061.
B 5542	Arcady Hog Meal and Humus.	Average..... { G.* F.* 11.2	18.3 18.5	4.0 4.5	6.5 6.5 3.00	Same as B 5061 without gluten feed.

COMMERCIAL FEEDING STUFFS

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B 5568	Arady Hog Meal and Humus.....	St. John.....	8.3	20.4	4.3	7.4	\$3.50	Same as B 5023 with corn germ meal.
	Average.....		9.8	18.1	4.2	7.5		
B 968	My Hog Feed..... J. E. Bartlett Co., Jackson, Mich.	Hilldale..... { G. F.	..... 9.3	15.0 15.6	4.0 4.2	10.0 9.6	3.50	Corn oil cake meal, corn feed meal, digester tankage, alfalfa leaf meal, wheat bran, wheat screenings, humus.
B 5313	Bartlett's Dairy Hog Feed.....	Jackson..... { G. F.	..... 9.7	15.0 17.4	4.0 5.1	14.0 8.8	3.00	Lined meal, rice polish, wheat bran, wheat middlings, tankage, corn, corn screenings, screenings.
B 4659	Blatchford Calf Meal Factory, Waukegan, Ill. Blatchford's Pig Meal.....	GrandRapids..... { G. F.	..... 10.7	18.0 23.7	5.0 4.9	7.0 6.3	5.25	Cottontail meal, lined meal, linseed meal, flaxseed unpressed, rice polish, coarseshell meal, barley and malt sprout meal, blood flour, wheat flour, oat meal, ground beans and peas, corn meal, anise, charcoal, salt.
B 5900	Caughy Jeeman Co., Detroit, Mich. Common Sense Hog Feed.....	Romoso..... { G. F.	..... 11.8	18.0 15.4	5.5 5.4	10.0 6.9	3.75	Cottontail meal, lined meal, wheat middlings, peanuts meal, corn products, barley.
B 4678	Chapin & Company, Chicago, Ill. Blorn Hog Feed.....	Jamestown..... { G. F.	..... 10.3	17.5 19.4	4.5 4.1	6.0 5.4	80.00	Lined meal, gluten feed, hominy feed, bone meal, wheat middlings oats, corn germ meal, corn feed meal, barley, digester tankage, salt.
B 5444	Blorn Hog Feed.....	Holland.....	9.8	17.8	4.0	5.7	4.00	Same as B 4678.
B 5381	C. E. De Puy Co., Pontiac, Mich. Fig Meal.....	Average..... { G. F.	10.1 11.1	18.6 12.0 12.6	4.1 3.7 3.5	5.6 7.0 4.9	3.60	Lined meal (trace), oats, corn, barley, rye.
B 5311	Albert Dickinsen Co., Minneapolis, Minn. Queen Hog Fattening Ration.....	Marquette..... { G. F.	..... 10.7	13.5 14.9	5.0 4.7	12.5 10.8	3.25	Alfalfa meal, wheat middlings, tankage, corn feed meal, corn bran barley feed, screenings, salt.
B 5313	Queen Hog Fattening Ration.....	Marquette..... { G. F.	..... 10.1	14.8 14.8	4.5 4.5	9.8 9.8	3.50	Same as B 5311.
B 5317	Queen Growing Hog Ration.....	Average..... { G. F.	10.4 9.5	14.9 17.0 18.8	4.6 3.8 4.9	10.3 11.5 9.9	3.90	Lined meal, gluten feed, wheat middlings, corn feed meal, corn bran, barley feed, screenings, salt.
B 5021	Rival Hog Feed.....	Brunson..... { G. F.	..... 10.3	12.5 14.5	5.0 3.7	12.5 9.8	3.10	Lined meal, alfalfa meal, screenings from wheat, oats, kafir corn, barley, feed meal, corn bran, salt.
B 5245	Rival Hog Feed.....	Holly..... { G. F.	..... 10.5	13.6 13.6	5.0 5.2	10.6 10.6	3.40	Same as B 5021.
B 5780	Rival Hog Feed.....	Sturgis..... { G. F.	..... 10.1	15.3 15.3	5.2 5.0	10.1 10.1	3.25	Same as B 5021.
B 5245	Grain Belt Mills Co., So. St. Joseph, Mo. Gee Bee Hog Feed.....	Average..... { G. F.	10.3 11.8	14.5 15.0 17.1	4.6 5.0 3.3	10.2 8.5 5.8	3.90	Alfalfa, wheat shorts, tankage, corn germ meal, corn feed meal, molasses.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5152	Hales & Hunter Co., Chicago, Ill. (formerly Hales & Edwards Co.) College Hog Feed.	Holland. { G.* F.*	16.0 11.2	16.0 18.7	4.0 4.0	10.0 7.0	\$3.80	Alfalfa meal, wheat bran, flour middlings, digester tankage, ground oats, corn feed meal, ground barley, lime, salt.
B 5270	Pioneer Pig Feed with Dried Buttermilk.	Howell. { G.* F.*	16.0 10.2	16.0 19.1	4.0 5.5	9.0 7.4	4.00	Linseed meal, dried buttermilk, wheat middlings; wheat, kafir corn, barley and rye screenings, corn feed meal.
B 5551	Pioneer Pig Feed with Dried Buttermilk.	Lansing. { G.* F.*	9.8 10.0	20.1 19.6	5.0 5.3	6.5 7.0	4.50	Linseed meal, dried buttermilk, wheat bran, wheat middlings, digester tankage, corn feed meal, screenings.
B 5224	Interstate Feed Association, Toledo, Ohio. Superior Hog Feed.	Average. { G.* F.*	9.6 9.6	17.8 17.8	6.3 6.3	11.9 11.9	60.00	Corn bran, oil cake meal, coccoahell meal, hominy feed, wheat by-product (Possum Cereal Co.), small amounts wheat, bran and middlings and oat hulls, possible trace, gluten feed.
B 5652	Superior Hog Feed.	Blissfield.	8.7	18.3	6.1	11.5	3.45	Linseed meal, hominy feed, coccoahell meal, cooked wheat product (toasted wheat feed), corn bran.
B 5665	Superior Hog Feed.	Blissfield.	9.3	18.1	6.3	11.9	.....	Toasted wheat feed, linseed meal, cocco shells, hominy, corn bran (cracked), small amount of wheat bran, wheat middlings, gluten meal, soyme meal, very few oat hulls (cracked).
B 1329	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Hog Feed.	Average. { G.* F.*	9.2 15.0	18.1 18.0	6.2 4.8	11.8 5.6	2.75	Hominy feed, red dog flour, O. P. linseed meal, corn feed meal, corn germ meal, wheat middlings, tankage, corn gluten feed, barley salt.
B 5266	Badger Hog Feed.	Hastings.	10.4	18.5	4.6	6.8	4.00	Same as B 1329.
B 5498	Badger Hog Feed.	Menominee Plainwell.	11.0 10.5	14.6 17.0	5.0 4.8	7.1 6.5	.....	Same as B 1329.
B 1351	Larowe Milling Co., Detroit, Mich. Larowe Hog Feed.	Average. { G.* F.*	10.5 18.0	17.0 19.6	4.8 5.6	6.5 7.9	.....	Dried beet pulp, wheat bran, wheat middlings, corn germ meal, hominy feed, linseed meal, meat meal, $\frac{1}{2}$ of 1% salt.
B 5123	Larowe Hog Feed.	Zeland.	10.2	19.6	5.6	7.9	4.00	Same as B 1351.
B 5886	Larowe Hog Feed.	Birmingham.	11.2	19.5	5.8	7.5	4.00	Same as B 1351 with gluten feed.
B 933	McMillen Co., Fort Wayne, Ind. Wayne Hog Feed with Molasses.	Average. { G.* F.*	10.2 17.5	20.2 18.9	5.5 5.5	7.7 6.6	.....	Corn germ meal, corn gluten feed, corn feed meal, red dog flour, coccoahell oil meal, wheat middlings, ground barley, linseed oil meal, alfalfa meal, tankage, molasses, salt.
B 5079	Park & Pollard Co., Chicago, Ill. Gottuit Hog Ration.	Tokonahe. { G.* F.*	11.2 15.0	18.9 20.6	5.5 6.6	6.6 10.0	72.00	Linseed meal, hominy feed, coccoahell meal, meat scraps, fish, bone, alfalfa meal, wheat middlings, rice bran, oat meal, mill by-products, corn meal, corn germ meal, calcium hydrosulfide and carbonate, salt.

B 5134	Goitait Hog Ration.....	Zealand.....	9.6	19.6	6.2	11.9	3.75	Same as B 5079.
	Purina Mills, Raikston Purina Co., St. Louis, Mo.	Average.....	8.7	20.1	6.4	11.0		
B 5286	Purina Pig Chow.....	{ G. F. }	11.6	16.5	2.6	9.8		Linseed meal, gluten feed, hominy feed, alfalfa, tankage, cracked corn, barley, molasses, charcoal, salt.
B 5791	Purina Pig Chow.....	Cassopolis.....	14.3	16.4	3.3	5.3	3.60	Same as B 5286 without barley and with corn meal.
	Reesebaum Bros., Chicago, Ill.	Average.....	13.0	16.5	3.0	7.5		
B 4799	Vitality Hog Feed with milk albumen and pure blood meal.....	{ G. F. }	20.0	4.0	9.0			Linseed meal, bone meal, blood meal, digester tankage, wheat middlings, ground oats and barley, salt, milk albumen.
B 5088	Vitality Hog Feed with milk albumen and pure blood meal.....	Springport.....	10.5	20.6	3.6	5.4	4.25	
		Jackson.....	9.9	22.3	4.0	5.8	4.25	Same as B 4799 with corn feed meal.
		Average.....	10.2	21.5	3.8	5.6		
B 4683	Will Pay Hog Feed with Milk Albumen and Pure Blood Meal.....	{ G. F. }	14.0	3.5	9.5			Linseed meal, bone meal, blood meal, wheat middlings, milk albumen, ground and bolted wheat, millet seeds, ground oats, corn feed meal, ground barley, salt.
B 4795	Will Pay Hog Feed with Milk Albumen and Pure Blood Meal.....	Grand Rapids.....	11.0	15.4	5.5	6.8	3.70	
		Springport.....	10.7	17.1	3.9	7.1	3.75	Linseed meal, bone meal, blood meal, wheat bran and middlings, oats, corn feed meal, barley and kafir screenings, milk albumen, salt.
B 5085	Will Pay Hog Feed with Milk Albumen and Pure Blood Meal.....	Clinton.....	10.1	17.4	3.4	5.7	3.00	Same as B 4795.
B 5163	Will Pay Hog Feed with Milk Albumen and Pure Blood Meal.....	Benton Harbor.....	10.4	15.9	4.5	7.1	70.00	Linseed meal, bone meal, blood meal, wheat middlings, milk albumen, ground and bolted wheat, barley and kafir screenings, oats, corn feed meal.
	Ryde & Company, Chicago, Ill.	Average.....	10.6	16.5	4.3	6.7		
B 5367	Rydes Pig Meal.....	{ G. F. }	21.0	6.0	6.0			Cottonseed meal, hominy feed, locust bean meal, beans, flaxseed, coconut meal, meat scrap, blood meal, wheat middlings, oat meal, oat hulls, corn meal, leungreek, anise, salt.
B 1302	Watson Higgins Milling Co., Grand Rapids, Mich.	Grand Rapids.....	12.5	10.6	5.0	3.7	1.50	
B 5142	Prize Hog Meal.....	{ G. F. }	11.3	10.7	3.1	4.1	48.00	Corn, oats, kafir corn.
		Grand Rapids.....	11.9	10.7	4.1	3.9		Wheat, oats, corn, buckwheat, barley.
	E. L. Wellman, Grand Rapids, Mich.	Average.....	10.0	3.2	10.0			Cottonseed meal, linseed meal, yellow hominy feed, hominy feed, oat meal mill by-product, wheat middlings with ground screenings, ground puffed rice, ground corn, ground barley, salt, calcium phosphate.
B 4661	Qualified Hog Feed.....	{ G. F. }	10.8	11.5	3.5	9.9	60.00	
	Western Packing & Provision Co., Chicago, Ill.	Grand Rapids.....	14.0	3.0	6.0			Meat tankage, corn bran, straw.
B 1385	Sterilized Animal Feed.....	{ G. F. }	7.7	16.3	5.1	10.1	54.00	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
DAIRY AND STOCK FEEDS.								
Amendt Milling Co., Monroe, Mich.								
B 5212	Amco Dairy Feed	Ypsilanti. { G.* F.*	22.0 8.9	22.3 22.4	5.0 5.0	13.0 11.0	72.50	Cottonseed meal, linseed meal, gluten meal, brewers grains, wheat bran, wheat middlings, vinegar grains, oats, barley.
B 5659	Amco Dairy Feed	Monroe. { G.* F.*	9.3 22.4	22.3 22.4	5.0 5.0	9.3	68.00	Cottonseed meal, linseed meal, gluten feed, brewers grains, distillers grains, wheat bran, wheat middlings, vinegar grains, corn feed meal.
B 5863	Amco Dairy Feed	Trenton. { G.* F.*	8.7	22.9	5.2	10.5	.....	Same as B 5212 without oats and barley, with corn feed meal.
Amour Grain Co., Chicago, Ill.								
B 5485	Amour Dairy Feed	Average. { G.* F.*	9.0 22.5	22.5 24.4	5.1 5.2	10.3 12.3	.....	Cottonseed meal, linseed meal, gluten feed, coconut meal, wheat bran, oat middlings, oat shorts, oat hulls, corn germ meal, salt.
J. J. Badenoeh Co., Chicago, Ill.								
B 4665	Milky Way Dairy Ration	Grand Rapids. { G.* F.*	10.3 19.9	20.0 19.9	5.0 4.5	12.0 10.7	68.00	Cottonseed meal, linseed meal, gluten feed, wheat bran, wheat middlings, screenings not exceeding mill run, clipped oat by-products, corn feed meal, ground barley, calcium phosphate, salt.
B 5166	Milky Way Dairy Ration	Benton Harbor. { G.* F.*	9.0 23.0	23.0 23.1	5.1 5.0	10.5 10.5	70.00	Same as B 4665.
B 5717	Milky Way Dairy Ration	Wayland. { G.* F.*	8.5 22.0	23.1 22.0	5.0 4.9	10.5 10.6	.....	Same as B 4665 without ground barley and calcium phosphate.
Chas. F. Bartlett, Grand Rapids, Mich.								
B 4693	Economy Ready Ration Dairy Feed	Grand Rapids. { G.* F.*	8.8 18.0	22.0 18.0	4.0 4.5	14.0 13.6	66.80	Cottonseed meal, linseed meal, ground wheat, wheat bran, dried malt, broken wheat, bluest, oat feed, salt.
B 5623	Economy Ready Ration Dairy Feed	Reese. { G.* F.*	8.6 17.1	17.1 17.1	3.6 3.6	20.1	76.00	Cottonseed meal, linseed meal, brewers grains, malt, wheat, wheat bran, cooked bran products, oat feed, corn feed meal, screenings, salt.
B 5712	Economy Ready Ration Dairy Feed	Grand Rapids. { G.* F.*	8.7 22.8	22.8 22.8	4.6 4.6	12.2	.....	Cottonseed meal, linseed meal, gluten feed, malt feed, wheat bran, wheat middlings, ground wheat screenings, oat meal mill by-products, corn bran.
B 5487	Farmer Brand Dairy Feed	Average. { G.* F.*	8.7 19.6	19.6 20.0	4.2 5.0	15.3 14.0	3.90	Cottonseed meal, wheat bran, screenings, salt, by-product from postum.
J. E. Bartlett Co., Jackson, Mich.								
B 5240	Common Sense Dairy Feed	Wayne. { G.* F.*	9.4 15.0	15.0 15.4	5.5 5.4	12.0 9.7	3.15	Cottonseed meal, alfalfa, bran, wheat middlings, peanut meal, oat products, corn feed meal.
B 5840	Common Sense Dairy Feed	Detroit. { G.* F.*	9.9 15.4	15.4 15.4	7.0 7.0	7.6	.....	Same as B 5240.
Average								
			9.7	15.2	6.2	8.7	.....

B	Feed	Company	Stephenson		18.0	5.0	11.0	Cottonseed meal, linseed meal, hominy meal, brewers grains, malt sprouts, wheat bran, wheat middlings, salt.
			{ G.*	{ F.*				
B 5302	Cenozo Ready Ration Dairy Feed	Cenozo Milling Co., Wausau, Wis.	9.6	21.1	18.0	5.0	11.0	
B 4636	Centauro Stock Feed	Chapin & Company, Chicago, Ill.	11.0	15.0	12.0	4.0	8.0	
B 5441	Centauro Stock Feed	Chapin & Company, Chicago, Ill.	10.0	13.7	11.0	4.1	7.8	
						5.3	6.6	
			Average	10.5	14.4	4.7	7.2	
B 4634	Unicorn Dairy Ration	Unicorn Dairy Ration	9.9	25.9	26.0	4.5	10.0	
B 4630	Unicorn Dairy Ration	Unicorn Dairy Ration	9.6	25.2	25.2	5.5	10.4	
B 5227	Unicorn Dairy Ration	Unicorn Dairy Ration	9.9	26.1	26.1	5.5	9.8	
B 5276	Unicorn Dairy Ration	Unicorn Dairy Ration	9.2	26.3	26.3	5.5	9.2	
B 5476	Unicorn Dairy Ration	Unicorn Dairy Ration	8.8	26.4	26.4	5.5	10.3	
B 5470	Unicorn Dairy Ration	Unicorn Dairy Ration	9.3	26.1	26.1	6.1	8.9	
B 5421	Unicorn Dairy Ration	Unicorn Dairy Ration	9.4	25.3	25.3	5.5	8.0	
B 5708	Unicorn Dairy Ration	Unicorn Dairy Ration	9.3	25.9	25.9	5.5	9.5	
			Average	9.3	25.9	5.5	9.5	
B 945	Unicorn Dairy Ration	Unicorn Dairy Ration	10.4	25.8	24.0	4.5	10.0	
B 1336	Unicorn Dairy Ration	Unicorn Dairy Ration	10.5	25.3	25.3	5.0	8.2	
			Average	10.5	25.6	4.8	7.8	
B 5880	Dairy Feed	C. E. De Puy Co, Pontiac, Mich.	17.3	12.8	17.3	4.0	9.2	
			10.6	12.8	12.8	2.7	8.1	
			Average	10.5	25.6	4.8	7.8	
B 4676	Dickinson Dairy Feed	Albert Dickinson Co., Chicago, Ill.	8.7	23.9	24.0	5.5	11.0	
B 5116	Dickinson Dairy Feed	Albert Dickinson Co., Chicago, Ill.	11.1	24.1	23.9	5.5	9.3	
B 5271	Dickinson Dairy Feed	Albert Dickinson Co., Chicago, Ill.	8.9	24.9	24.1	5.2	10.9	
B 5743	Dickinson Dairy Feed	Albert Dickinson Co., Chicago, Ill.	9.1	24.5	24.9	5.8	9.4	
			Average	9.5	24.4	5.4	9.9	
B 5371	Queen Dairy Feed	Queen Dairy Feed	9.3	20.3	20.0	4.0	10.0	
B 5178	Stag Stock Feed	Stag Stock Feed	9.4	11.6	9.0	3.0	12.0	
			Average	9.3	20.3	5.0	15.4	
B 5471	Polo Dairy Feed	Dixie Mills Co., St. Louis, Mo.	17.5	16.9	17.5	3.5	16.0	
			9.3	16.9	16.9	5.6	15.8	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5356	Dodge Hooker Mills, Wausau, Wis. Wisconsin Balanced Ration.	Escanaba..... { G.* F.*	18.0 10.9	18.0 21.1	5.0 5.8	11.0 9.4	\$4.00	Cottonseed meal, linseed meal, gluten feed, hominy meal, brewers grains, malt sprouts, wheat bran, wheat middlings, oat feed, barley feed, salt.
B 5374	Wisconsin Balanced Ration.	Iron Mountain..... Average.....	9.7 9.9	22.0 21.6	4.8 5.3	9.0 9.2	73.00	Same as B 5356 without oat feed and with corn oil cake.
B 5235	Interstate Feed Association, Toledo, Ohio. Mormilk Dairy Feed	(1919) { Blissfield..... { G.* F.*	22.0 9.3	22.0 20.3	6.0 4.0	12.0 13.4	70.00	Cottonseed meal, linseed meal, gluten feed, hominy, wheat bran, wheat middlings, oat meal mill by-products.
B 5666	Mormilk Dairy Feed	Blissfield..... Average.....	8.6 9.0	20.8 20.4	4.2 4.1	13.6 13.0		Same as B 5235 with corn feed meal, corn bran (treated).
B 5496	Mormilk Dairy Feed	(1920) { Plainwell..... { G.* F.*	25.0 10.7	25.0 26.4	6.0 5.0	10.0 9.7		Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran.
B 5651	Mormilk Dairy Feed	Blissfield..... Average.....	8.6 9.7	20.4 23.4	4.0 4.5	4.0 6.9	3.50	Same as B 5496 with wheat middlings, oat feed.
B 4672	Chas. A. Krause Milling Co., Milwaukee, Wis. Cream City Dairy Feed	Hudsonville..... { G.* F.*	19.0 9.6	19.0 16.7	4.5 3.4	15.0 17.8		Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers grains, malt sprouts, wheat bran, wheat middlings, oat meal mill by-products, corn germ meal, rye middlings, salt.
B 5003	Cream City Dairy Feed	Albion.....	10.0	20.3	4.0	13.5	68.00	Same as B 4672.
B 5105	Cream City Dairy Feed	Muskegon..... Average.....	9.8 9.8	19.8 18.9	4.4 3.9	16.3 15.9	70.00	Same as B 4672 without gluten feed.
B 4675	Krause Dairy Feed	Hudsonville..... { G.* F.*	24.0 9.0	24.0 23.9	5.0 4.9	13.0 11.8		Cottonseed meal, linseed meal, gluten feed, hominy feed, brewers grains, malt sprouts, wheat bran, wheat middlings, corn germ meal, salt.
B 5280	Krause Dairy Feed	Fowlerville.....	9.2	23.9	4.6	11.0	72.50	Same as B 4675 with screenings.
B 5457	Krause Dairy Feed	Holland.....	8.9	24.6	5.2	11.0	3.90	Same as B 4675 without wheat bran, wheat middlings, corn germ meal, salt.
B 5500	Krause Dairy Feed	Plainwell..... Average.....	10.2 9.3	25.0 24.3	5.5 5.1	11.4 11.3		Same as B 4675 with rye middlings.
B 5036	Larowe Milling Co., Detroit, Mich. Big Six Dairy Feed	Williamston..... { G.* F.*	21.0 10.0	20.7 20.7	5.5 5.5	8.6 8.6	75.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran, wheat middlings, screenings, salt.
B 5317	Big Six Dairy Feed	Jackson.....	10.0	22.1	5.7	8.0	4.15	Same as B 5036.
B 5609	Big Six Dairy Feed	Bay City..... Average.....	10.5 10.2	22.4 21.7	4.9 5.4	8.3 8.3	4.00	Same as B 5036.

B 4681	Larro-Feed.	Grand Rapids	90.0	8.0	14.0	78.00	Cottonteed meal, linseed meal, gluten feed, dried beet pulp, wheat bran, wheat middlings, salt.
B 5033	Larro-Feed.	St. Johns	10.2	3.8	12.9	70.00	Same as B 4681.
B 5037	Larro-Feed.	Williamston	10.1	21.1	4.1	75.00	Same as B 4681.
B 5137	Larro-Feed.	Zealand	10.7	20.3	4.4	74.00	Same as B 4681.
B 5247	Larro-Feed.	Wayne	10.2	19.9	3.9	77.00	Same as B 4681.
B 5384	Larro-Feed.	Birch Run	10.1	19.8	3.8	75.00	Same as B 4681.
B 5894	Larro-Feed.	Rochester	9.3	22.9	4.0	4.00	Same as B 4681.
		Average.	10.1	20.6	4.0	12.0	
	The Ladish Milling Co. (formerly Stratton-Ladish Milling Co.), Milwaukee, Wis.						
B 5678	National Stock Feed.	Port Huron	9.0	8.0	12.0	3.25	Linseed meal, wheat bran, oat meal mill by-product, corn feed meal, screenings, salt.
			9.7	3.8	11.2		
B 5192	Nowak Milling Corporation, Buffalo, New York.	Zealand	80.0	4.0	16.0		Cottonteed meal, linseed meal, gluten meal, gluten feed, brewers grains, coconut meal, wheat bran, ground and boiled grain screenings, salt.
B 5796	Domino Creamery Feed.	Grand Rapids	8.0	21.9	5.9	11.6	Cottonteed meal, linseed meal, gluten feed, brewers grains, wheat screenings, wheat bran, salt.
			8.6	20.2	5.5	11.2	
		Average.	8.3	21.1	5.7	11.4	
B 4792	Park & Pollard Co., Chicago, Ill.	Eaton Rapids	41.0	5.0	14.0	4.00	Cottonteed meal, linseed meal, gluten meal, hominy feed, brewers grains, distillers grains, pea meal, coconut oil meal, wheat bran meal, middlings, screenings, barley, salt.
			22.7	5.1	9.6		
B 5136	Stevens 44 Dairy Ration.	Zealand	11.8	23.5	5.6	10.3	Same as B 4792 without buckwheat middlings, barley, with corn germ meal.
B 5273	Stevens 44 Dairy Ration.	Millford	9.5	24.8	5.4	12.8	Same as B 4792 without distillers grains, corn meal, buckwheat middlings, with malt sprouts, corn feed meal, buckwheat grits, buckwheat bran.
B 5628	Stevens 44 Dairy Ration.	Lapeer	9.5	23.9	4.6	11.3	Same as B 4792 without buckwheat middlings.
B 5761	Stevens 44 Dairy Ration.	Buchanan	9.2	27.1	5.0	10.7	
		Average.	9.9	24.4	5.1	10.9	
B 1371	Purity Oats Co., Davenport, Iowa.	South Haven	10.0	4.0	15.7		Wheat middlings, corn meal, hominy feed, gluten feed, oat hulls, oat shorts, 1% salt.
			10.3	4.4	10.5		
		Average.	9.9	4.4	10.5		
	Quaker Oats Co., Chicago, Ill.						
B 1338	Big Q Dairy Ration.	Sparta	21.0	5.0	10.6	70.00	Cottonteed meal, corn gluten feed, wheat middlings, wheat bran, screenings, oat meal mill by-product, hominy, linseed, 1% salt.
B 5054	Big Q Dairy Ration.	Jackson	9.4	21.7	5.0	10.3	Same as B 1338 with brewers grains, distillers grains.
B 5292	Big Q Dairy Ration.	Grass Lake	2.2	20.7	4.3	10.6	Same as B 1338 with distillers grains.
B 5249	Big Q Dairy Ration.	Plymouth	8.6	21.1	5.0	11.3	Same as B 1338 with distillers grains.
B 5408	Big Q Dairy Ration.	Novi	9.0	20.2	4.4	10.2	Same as B 1338 with distillers grains.
B 5418	Big Q Dairy Ration.	Traverse City	8.9	20.8	4.7	11.3	Same as B 1338 with distillers grains.
		Average.	8.5	23.8	4.7	11.9	Same as B 1338 with distillers grains.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Quaker Oats Co.—Con.								
B 5206	Blue Ribbon Dairy Feed.	Ann Arbor..... { G.* { F.*	9.0	21.0	6.0	14.0	\$75.00	Cottonseed meal, linseed meal, gluten feed, distillers grains, wheat bran, screenings, oat meal mill by-product calcium phosphate, salt.
B 1339	Schumacher Feed.	Sparta..... { G.* { F.*	9.1	10.0	3.2	10.0	56.00	Ground corn, hominy feed, linseed meal, ground barley, wheat middlings, cottonseed meal, oat meal mill by-products, 1% salt, calcium phosphate, wheat bran, ground puffed wheat and rice.
B 5029	Schumacher Feed.	Coldwater.....	9.3	12.4	4.0	9.3	3.50	Same as B 1339 with yellow hominy feed.
B 5050	Schumacher Feed.	Jackson.....	9.9	11.9	3.7	9.2	3.30	Same as B 1339 without ground corn, ground barley, wheat bran, ground puffed wheat and rice; calcium phosphate, with calcium carbonate, rye flour.
B 5155	Schumacher Feed.	Holland.....	12.9	12.0	4.9	10.1	65.00	Same as B 1339 without wheat middlings, wheat bran, calcium phosphate, ground puffed wheat and rice, with rye flour, yellow hominy feed.
B 5419	Schumacher Feed.	Traverse City.....	10.0	12.6	3.8	12.0	68.00	Same as B 1339 without wheat bran, ground puffed wheat and rice, with rye flour.
B 5431	Schumacher Feed.	Oodillac.....	7.7	12.4	3.6	8.8	60.00	Same as B 1339 without ground corn, wheat bran, ground puffed wheat and rice.
Rosenbaum Bros., Chicago, Ill.								
B 4798	Vitality Dairy Feed.	Average.....	9.8	12.3	4.1	10.0		Cottonseed meal, linseed meal, gluten feed, wheat bran and middlings, salt, corn feed meal, barley, salt.
B 5097	Vitality Dairy Feed.	Springport..... { G.* { F.*	10.2	20.8	4.4	9.0	4.25	Same as B 4798.
B 5282	Vitality Dairy Feed.	Jackson.....	9.2	23.3	5.3	9.3	4.00	Same as B 4798.
		Frankenmuth.....	9.3	22.9	5.3	9.1	80.00	Same as B 4798.
Average.....								
			9.8	22.3	5.0	9.2		
B 5095	Vitality Stock Feed.	Average..... { G.* { F.*	10.7	10.6	3.0	12.0		Wheat bran, oats, oat hulls, corn feed meal, barley, salt.
B 5096	Vitality Stock Feed.	Jackson.....	10.2	10.3	3.6	9.8	3.30	Same as B 5095 with oat meal mill by-products.
B 5332	Vitality Stock Feed.	Holly.....	10.1	10.6	3.8	8.1	3.40	Same as B 5095 with oat meal mill by-products.
Average.....								
			10.3	10.5	3.5	8.8		
Saginaw Milling Co., Saginaw, Mich.								
B 5596	Pioneer Stock Feed.	Average..... { G.* { F.*	10.6	12.9	2.0	5.0		Wheat bran, oats, corn, barley.
B 5615	Pioneer Stock Feed.	Saginaw.....	10.6	12.9	4.7	6.8	64.00	Bran, oats, corn, barley.
		Caro.....	10.6	12.9	4.8	6.5	3.50	
Average.....								
			10.7	12.9	4.8	6.7		
B 5524	Pittsford Dairy Ration.	F. J. Smith, Pittsford, Mich. Sault Ste. Marie..... { G.* { F.*	12.0	14.7	2.1	5.6	4.15	Peas, flax, wheat, wheat bran, wheat middlings, oats, corn meal, corn bran, barley feed, screenings.

B 5523	Pickford Star Feed.....	14.1	2.0	4.6	.....	Wheat, wheat middlings, ground oat, corn meal, screenings, rye ground peas.
B 5210	Union Grains Biles Ready Dairy Ration.....	8.6	5.0	10.0	.....	Cottonseed meal, linseed meal, gluten feed, hominy meal, brewers grains, distillers grains, malt sprouts, coconut meal, wheat bran, wheat middlings, salt.
B 5025	Union Grains Biles Ready Dairy Ration.....	8.9	4.4	10.5	78.00	Same as B 5210 without coconut meal; with barley.
B 5060	Union Grains Biles Ready Dairy Ration.....	9.2	4.9	9.7	77.50	Same as B 5210.
B 5700	Golden Cream Dairy Feed.....	8.9	4.8	9.5	.....	Cottonseed meal, linseed meal, gluten feed, wheat bran, wheat middlings, oat meal mill by-products.
B 5705	Golden Cream Dairy Feed.....	8.6	5.5	15.4	.....	Same as B 5700 without wheat middlings, oat meal mill by-products; with reground oat feed.
B 5803	Golden Cream Dairy Feed.....	8.1	4.6	12.5	75.00	Same as B 5705.
B 5855	Excelsior Stock Food.....	8.3	5.5	14.2	.....	Corn meal, linseed, salt, gentian, licorice, anise, fenugreek, sawdust, sulphur, ginger.
B 5130	Qualified Dairy Feed.....	10.3	4.3	10.7	70.00	Cottonseed meal, linseed meal, hominy feed, gluten feed, distillers grains, wheat bran, wheat middlings, screenings, oat meal mill by-products, salt, by-product from manufacture of lard and corn meal by degumination process with special extraction of oil.
B 5413	Qualified Dairy Feed.....	8.7	4.7	10.7	3.00	Same as B 5130.
B 5302	Calumet Dairy Feed.....	8.0	4.6	14.8	.....	Cottonseed meal, linseed meal, gluten feed, brewers grains, wheat bran, wheat middlings, ground clipped oat by-product, corn (trace).
B 5776	Calumet Dairy Feed.....	8.8	4.5	14.3	3.75	Same as B 5302 without wheat middlings and corn.
B 5735	Peerless Dairy Ration.....	8.8	4.6	13.9	.....	Cottonseed meal, linseed meal, wheat bran, barley malt, corn flake feed, oats, salt.
B 5353	Sucrose Dairy Feed.....	16.5	3.5	14.0	.....	Cottonseed meal, coconut meal, clipped oat by-products, corn feed meal, barley, molasses, screenings, salt, calcium carbonate.
B 969	Arco Milk Ration.....	20.0	4.0	18.0	.....	O. P. oil meal, cottonseed meal, wheat bran, corn oil meal, corn gluten feed, oat meal mill by-products, screenings, molasses, salt.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
	Arady Farms Milling Co.—Con.							
B 5019	Producers Ready Ration.....	Broun..... { G° F°	10.0	19.0 16.8	4.0 3.0	11.0 16.3	\$3.75	Cottonseed meal, linseed meal, gluten feed, wheat bran, wheat middlings, oat meal mill by-products, corn oil cake meal, molasses, salt.
B 5072	Producers Ready Ration.....	Hudson.....	13.3	17.2	3.4	11.4	75.00	Same as B 5019 without corn oil cake meal.
B 5541	Producers Ready Ration.....	Ann Arbor.....	10.0	21.9	4.0	9.6	3.90	Same as B 5019.
B 5545	Producers Ready Ration.....	Owosso.....	9.6	19.4	3.7	11.2	72.00	Same as B 5019 with charcoal.
B 5641	Producers Ready Ration.....	Hudson.....	9.0	18.9	4.0	11.2	78.00	Same as B 5019 without linseed meal.
	Average.		10.4	18.8	3.6	11.9		
	Champion Feed Milling Co., Lyons Iowa.							
B 5181	Champion Molasses Feed.....	Bangor..... { G° F°	11.0 11.9	11.0 11.3	1.6 3.2	8.0 7.5	60.00	Cottonseed meal, ground flax screenings, flax plant by-products, wheat bran, wheat screenings, charred peat, molasses.
B 5239	Lactola Dairy Feed.....	Wayne..... { G° F°	16.5 10.4	20.2	4.2	12.0 11.0	2.85	Cottonseed meal, gluten meal, brewers grains, coconut meal, yeast dried grains, ivory nut meal, molasses, salt.
B 5246	Grain Belt Mills Co., So. St. Joseph, Mo. Gee Bee Cattle Fastener.....	Wayne..... { G° F°	15.6 13.7	11.0 13.7	2.6 5.4	6.0 8.3	3.00	Cottonseed meal, alfalfa, cracked corn, corn feed meal, molasses, screenings, salt, humus.
B 5040	Gee Bee Dairy Feed.....	Jackson..... { G° F°	11.3 19.3	3.2 9.8	8.0	12.0	3.70	Cottonseed meal, alfalfa meal, wheat bran, corn germ meal, corn feed meal, molasses.
B 5227	Gee Bee Dairy Feed.....	Morenci..... { G° F°	9.9 21.1	3.8	11.3	72.00		Same as B 5049.
	Average.		10.6	20.2	3.5	10.6		
B 5244	Gee Bee Stock Feed.....	Wayne..... { G° F°	10.0 11.0	12.4	2.3	8.1	3.00	Cottonseed meal, alfalfa meal, wheat bran, wheat middlings, corn molasses.
B 5083	Red D Dairy Feed.....	Jackson..... { G° F°	16.6 14.9	4.0	15.0	10.0	2.80	Cottonseed meal, alfalfa meal, corn feed meal, screenings, molasses, salt.
B 5204	Red D Dairy Lake.....	Gram Lake.....	12.2	16.9	3.9	12.8	2.25	Same as B 5083.
B 5216	Red D Dairy Feed.....	Ypsilanti.....	12.0	18.6	4.2	14.0	86.00	Same as B 5083.
B 5779	Red D Dairy Feed.....	Lowell.....	13.0	16.5	4.0	11.1	80.00	Same as B 5083.
	Average.		13.5	16.9	3.9	12.1		
	Hales & Hunter Co., Chicago, Ill., (formerly Hales & Edwards Co.)							
B 1333	Gold Flake Dairy Feed.....	Jamstown..... { G° F°	16.3 14.0	10.0 14.0	3.6 2.1	16.0 13.8		Cottonseed meal, corn gluten feed, linseed oil meal, molasses, clipped oat by-products, ground and bolted wheat, barley and kafir screenings.
B 4066	Gold Flake Dairy Feed.....	Grand Rapids.....	11.8	12.4	3.3	20.6	80.00	Same as B 1333.

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B 4674	Gold Flake Dairy Feed.....	Hudsonville.....	10.5	15.8	4.0	11.1	\$54.00	Same as B 1353.
B 5603	Gold Flake Dairy Feed.....	Coopersville.....	10.6	13.4	2.2	17.1	Same as B 1353.
B 5706	Gold Flake Dairy Feed.....	Coopersville.....	12.1	12.7	3.0	17.6	.....	Same as B 1353.
	Average.....		12.0	13.7	2.9	16.0	.....
	Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 943	Badger Dairy Feed.....	Detroit.....	15.6	16.5	5.5	15.0	.....	Cottonseed meal, alfalfa meal, screenings, molasses, salt.
B 5179	Badger Dairy Feed.....	Bangor.....	13.4	15.3	4.1	16.2	.....	Same as B 943 with flax plant by-product.
B 5497	Badger Dairy Feed.....	Plainville.....	11.1	14.4	2.7	16.8	65.00	Same as B 5179.
B 5819	Badger Dairy Feed.....	Detroit.....	14.0	16.1	3.9	15.6	55.00	Same as B 5179.
	Average.....		13.5	14.9	3.8	16.5	.....
	The Ladish Milling Co. (formerly Stratton-Ladish Milling Co.), Milwaukee, Wis.							
B 5679	Record Maker Dairy Feed.....	Port Huron.....	9.7	24.0	4.5	13.0	.....	Cottonseed meal, linseed meal, corn gluten, hominy feed, cocoanut meal, alfalfa meal, wheat bran, oats, barley, molasses, salt.
B 5803	Lehtenberg & Son, Detroit, Mich.						4.10	
B 952	Farnel Dairy Feed.....	Detroit.....	9.5	25.0	4.0	12.0	.....	Cottonseed meal, gluten feed, brewers grains, distillers grains, wheat bran, wheat middlings, ground oat feed, molasses, screenings, including weed seeds, salt.
B 5781	McMillen Co., Fort Wayne, Ind.	Tekonsha.....	10.8	21.9	5.5	12.4	70.00	Wheat middlings, malt sprouts, cocoanut meal, brewers grains, corn gluten feed, wheat bran, alfalfa meal, cottonseed meal, linseed meal, molasses, salt.
	Average.....		12.7	21.9	6.4	9.5	.....	Same as B 952.
B 5187	Omaha Alfalfa Milling Co., Omaha, Nebr.	Grand Rapids.....	16.7	10.0	0.5	25.0	.....	Alfalfa meal, oats, corn, molasses.
B 5285	Green Meadow Dairy Feed.....		8.4	8.4	0.8	18.9	.....
B 5538	Purina Mills, Raisin Purina Co., St. Louis, Mo.	Vassar.....	11.6	24.0	4.5	12.0	.....	Cottonseed meal, linseed meal, gluten feed, hominy feed, alfalfa, molasses, salt.
B 5789	Purina Cow Chow Feed.....	Saginaw.....	11.7	23.4	5.1	13.8	4.20	Same as B 5285 with corn germ meal.
B 5790	Purina Cow Chow Feed.....	Detroit.....	9.5	20.1	5.3	11.7	83.00	Same as B 5285.
	Average.....	Caseopolis.....	10.3	27.1	5.4	10.7	80.00	Same as B 5285.
B 5314	Purina O-Molene Feed.....		10.8	25.6	5.0	11.5	.....	Alfalfa, oats, cracked corn, molasses, salt.
B 5357	Purina O-Molene Feed.....	Jackson.....	13.2	9.7	8.8	8.0	.....	Same as B 5314.
	Average.....	Saginaw.....	11.3	10.8	3.7	8.9	2.50	
B 5287	Purina Steer Fatena Feed.....		12.3	11.0	3.6	7.0	73.00	Cottonseed meal, alfalfa, corn, molasses, charcoal, salt.
		Vassar.....	16.4	18.0	1.8	10.0	.....
			16.4	13.4	1.7	10.0	3.00	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5263	The Quaker Oats Co., Chicago, Ill. Quaker Dairy Feed with molasses.....	{ G.* F.*	16.0 12.0	16.0 14.4	4.5 4.9	16.0 13.7	\$2.80	Cottonseed meal, distillers grains, oat meal mill by-products, calcium phosphate, screenings, molasses, salt.
B 5449	Rosenbaum Bros., Chicago, Ill. 77 Dairy Feed.....	{ G.* F.*	21.0 9.5	24.6 6.0	4.0 6.0	12.0 11.0	4.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, alfalfa meal, molasses, salt.
B 4796	Will Pay Dairy Feed.....	{ G.* F.*	16.0 10.6	16.0 20.4	3.5 4.5	14.0 9.4	70.00	Cottonseed meal, linseed meal, gluten feed, wheat, oats, corn, kafir, barley screenings, molasses, salt.
B 5096	Will Pay Dairy Feed.....	{ G.* F.*	10.2 18.7	18.1 3.7	3.7 8.7	3.0 3.10	3.10	Same as B 4796.
B 5205	Will Pay Dairy Feed.....	{ G.* F.*	12.5 16.1	16.1 3.4	3.4 10.2	58.00 65.00	58.00	Same as B 4796 with alfalfa meal.
B 5164	Will Pay Dairy Feed.....	{ G.* F.*	11.9 18.3	18.3 4.3	11.4 11.4	65.00 65.00	65.00	Same as B 4796.
B 5173	Will Pay Dairy Feed.....	{ G.* F.*	12.3 18.0	18.0 4.5	10.9 10.9	60.00 60.00	60.00	Same as B 4796.
B 5213	U. S. Food Products Corporation, Peoria, Ill. Atlas Dairy Feed with molasses.....	Average..... { G.* F.*	11.5 80.0	18.3 21.0	4.1 5.3	10.1 9.2	75.00	Cottonseed meal, gluten feed, malt sprouts, wheat bran, molasses.
B 4655	Western Grain Products Co., Hammond, Ind. Hammond Dairy Feed.....	{ G.* F.*	16.6 11.6	16.6 16.3	3.5 4.8	14.2 12.5	51.00	Cottonseed meal, distillers grains, ground clipped oat by-product, screenings, molasses, salt.
B 5135	Hammond Dairy Feed.....	{ G.* F.*	12.2 16.3	16.3 4.7	12.5 13.8	12.5 13.8	2.75	Same as B 4655 with coconut oil meal.
B 5232	Hammond Dairy Feed.....	{ G.* F.*	13.6 14.5	14.5 4.1	13.3 13.3	2.75 2.75	2.75	Same as B 4655 with coconut oil meal.
B 5066	Hammond Dairy Feed.....	{ G.* F.*	9.6 16.3	16.3 4.7	13.8 13.8	13.8 13.8	2.75	Same as B 4655 without distillers grains.
B 5331	Caughay Jeeman Co., Detroit, Mich. Royal Horse Chop.....	Average..... { G.* F.*	11.8 8.5	15.9 8.5	4.6 4.7	13.4 7.6	7.6	Oat hulls, corn meal, corn bran.
B 5342	Royal Horse Chop.....	{ G.* F.*	10.3 10.3	11.4 9.4	4.9 4.2	6.3 8.0	6.3	Same as B 5331.
B 5777	Albert Dickinson Co., Chicago, Ill. White Cross Horse Feed.....	Average..... { G.* F.*	10.3 9.8	10.4 11.8	4.6 5.1	7.2 8.0	3.45	Cruised oats, cracked corn
B 5855	White Cross Horse Feed.....	{ G.* F.*	9.5 12.1	12.1 4.6	7.4 7.4	7.4 7.4	3.20	Same as B 5777.
		Average.....	9.7	12.0	4.9	7.2		

HORSE FEEDS.

B 5427	Hales & Hunter Co. (formerly Hales & Edwards Co.), Chicago, Ill.	Excelsior Horse Feed.....	{ G* F* }	{ 10.0 11.3 8.5 }	{ 9.0 11.4 10.8 }	{ 8.0 4.0 3.8 }	8.0 4.9 6.2	70.00	Rolled oats, cracked corn sifted, rolled barley. Same as B 5427.
B 5492	Quaker Oats Co., Chicago, Ill.	Excelsior Horse Feed.....	{ G* F* }	{ 9.9 11.1 }	{ 9.3 11.1 }	{ 3.9 5.6 }	5.6		
B 5764	Schumacher Special Horse Feed.....	Nilas.....	{ G* F* }	{ 11.0 10.9 }	{ 9.3 8.8 }	{ 3.2 3.6 }	8.0 8.8		Oat meal mill by-products, crushed oats, ground corn, salt.
B 5765	White Diamond Feed.....	Nilas.....	{ G* F* }	{ 10.6 10.1 }	{ 9.0 4.3 }	{ 3.2 3.9 }	9.0 5.8	65.00	Hominy feed, oat meal mill by-products, calcium phosphate, ground corn, salt.
B 4662	E. L. Wellman Co., Grand Rapids, Mich.	Qualified Horse Feed.....	{ G* F* }	{ 11.9 9.3 }	{ 8.0 9.3 }	{ 3.2 3.9 }	9.0 5.8	65.00	Yellow hominy feed, hominy feed, oat meal mill by-products, ground corn, calcium phosphate, salt.
B 5758	MOLASSES HORSE FEEDS.	Arady Farms Milling Co., Chicago, Ill.	{ G* F* }	{ 8.0 8.6 }	{ 2.0 2.2 }	{ 15.0 15.0 }	15.0 15.0		Alfa's meal, oats, corn, molasses.
B 5126	Country Gentleman Horse Feed.....	J. J. Badenoch Co., Chicago, Ill.*	{ G* F* }	{ 10.0 10.2 11.1 }	{ 2.0 3.0 3.0 }	{ 16.0 10.7 8.5 }	16.0 10.7 8.5	3.10 66.00	Alfa's meal, crushed oats, corn and barley, molasses. Same as B 5126 without barley.
B 5115	The Albert Dickinson Co., Chicago, Ill.	Hobby Horse Feed.....	{ G* F* }	{ 12.9 10.7 }	{ 3.2 3.2 }	{ 9.6 9.6 }	9.6		Alfa's meal, oats, corn, molasses.
B 5417	Hobby Horse Feed.....	Traverse City.....	{ G* F* }	{ 16.2 10.8 15.0 }	{ 2.8 2.8 1.9 }	{ 12.4 12.1 10.9 }	12.4 12.1 10.9	59.00	Alfa's meal, oats, corn, molasses. Same as B 5115.
B 5656	Grain Bgt Milling Co., South St. Joseph, Mo.	Bronco Horse & Mule Feed.....	{ G* F* }	{ 15.6 11.4 }	{ 2.2 2.2 }	{ 11.7 11.7 }	11.7		Alfa's meal, oats, corn, molasses, salt. Same as B 5656.
B 5807	Bronco Horse & Mule Feed.....	Jackson.....	{ G* F* }	{ 14.3 9.8 16.8 }	{ 1.6 1.6 9.1 }	{ 12.1 11.8 11.8 }	12.1 11.8 11.8	2.85 56.00	Alfa's meal, oats, corn, molasses, salt. Same as B 5656.
B 5655	Extra Brand Horse and Mule Feed.....	Jackson.....	{ G* F* }	{ 15.6 9.5 }	{ 1.9 1.9 }	{ 12.0 12.0 }	12.0		Alfa's meal, oats, corn, molasses, salt.
B 5663	Grainbelt Tiger Feed.....	Mason.....	{ G* F* }	{ 14.0 10.7 10.7 }	{ 2.1 2.1 2.1 }	{ 11.4 11.4 11.4 }	11.4 11.4 11.4	3.20	Alfa's meal, molasses, salt.
B 5878	Green Leaf Feed.....	Pontiac.....	{ G* F* }	{ 12.5 10.1 12.6 }	{ 1.2 0.7 0.7 }	{ 17.5 17.5 17.5 }	17.5 17.5 17.5	2.65	Alfa's meal, molasses, salt.
B 5808	Pennant Horse and Mule Feed.....	Detroit.....	{ G* F* }	{ 15.8 12.6 18.2 }	{ 0.6 0.6 0.7 }	{ 16.8 16.8 16.8 }	16.8 16.8 16.8	2.50 51.00	Alfa's meal, oats, corn, molasses, salt.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
	Hales & Hunter Co. (Formerly Hales & Edwards Co.), Chicago, Ill.							
B 5100	College Horse Feed	Jackson..... (G.* F.*	10.0 12.1	10.0 12.0	2.5 3.9	10.0 6.9	\$3.30	Malt sprouts, wheat bran, oats, cracked corn, barley, molasses.
B 5552	College Horse Feed	Lansing..... (G.* F.*	12.1 13.2	9.7 9.7	3.8 6.7	6.7	3.75	Same as B 5100.
	Average.....		12.7	10.8	3.9	6.8		
B 1354	Harvest Horse Feed	Grand Rapids..... (G.* F.*	10.0 15.5	10.0 10.9	2.0 2.3	15.0 13.6	3.00	Alfalfa, cracked corn, oats, barley, molasses.
B 5739	Harvest Horse Feed	Battle Creek..... (G.* F.*	15.5 15.5	9.8 9.8	2.2 2.2	13.9 13.9		Same as B 1354.
B 5837	Harvest Horse Feed	Detroit..... (G.* F.*	18.7 18.7	9.7 9.7	1.7 1.7	14.3	3.20	Same as B 1354 without barley.
	Average.....		16.6	10.1	2.1	13.9		
B 5201	Kingdalfa Horse Feed	Stockbridge..... (G.* F.*	10.0 13.7	10.0 11.7	2.0 2.5	15.0 12.3	2.15	Alfalfa, oats, corn, barley, molasses.
	Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 5104	Badger Horse Feed	Muskegon..... (G.* F.*	10.0 14.4	10.0 9.9	2.0 2.9	12.0 9.9	3.50	Alfalfa meal, oats, corn, molasses, salt.
B 5823	Badger Pul-Mor Horse Feed	Detroit..... (G.* F.*	9.0 15.3	9.0 8.7	1.0 3.6	16.0 16.6	55.00	Alfalfa meal, flax plant refuse, oats, oat meal mill by-product, corn, molasses, salt.
B 5175	Blue Top Horse Feed	Coloma..... (G.* F.*	10.0 15.5	9.9 9.9	2.1 1.5	15.2 14.0		Alfalfa meal, oats, corn, molasses, salt.
B 5685	Cream City Horse Feed	Mt. Clemens..... (G.* F.*	10.0 15.1	11.1 11.1	2.2 2.2	13.6 13.6	3.00	Alfalfa meal, oats, corn, molasses, salt.
B 5824	Krause Horse Feed	Detroit..... (G.* F.*	10.0 14.8	10.0 12.3	2.5 3.5	10.0 10.0	63.00	Alfalfa meal, oats, corn, molasses, salt.
	Ladish Milling Co. (Formerly Stratton-Ladish Milling Co.), Milwaukee, Wis.							
B 5523	Str-Lad Horse Feed	Jackson..... (G.* F.*	9.2 9.1	10.7 10.7	2.5 3.9	11.0 9.7	3.50	Alfalfa meal, oats, cracked corn, molasses, salt.
B 5801	Farnel Horse Feed	Detroit..... (G.* F.*	10.0 13.8	10.9 10.9	5.5 4.6	8.0 7.4	60.00	Wheat bran, oats, corn, molasses, salt.
B 5401	Domino Vimolene Horse Feed	Ashlon..... (G.* F.*	8.0 10.2	9.6 9.6	2.0 1.9	2.0 14.5		Oats, corn, corn feed meal, molasses, salt.

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Omaha Alfalfa Milling Co., Omaha, Nebr.									
B 5190	Ginger Horse Feed.....	{ G.* F.*	10.0 8.8	2.0 2.1	12.0 10.4	Alfalfa meal, oats, corn, molasses.			
B 5805	Peerless Horse Feed.....	{ G.* F.*	10.0 10.6	2.0 2.7	12.0 10.9	Alfalfa meal, oats, corn, molasses.			
B 5189	Perfection Horse Feed.....	{ G.* F.*	9.0 14.3	2.0 9.4	\$60.00 9.8	Alfalfa meal, oats, corn, molasses.			
B 5188	Snappy Horse Feed.....	{ G.* F.*	9.0 16.3	2.0 8.8	12.0 12.9	Alfalfa meal, oats, corn, molasses.			
M. C. Peters Mill Co., Omaha, Nebr.									
B 5838	Peters Repeater Horse Feed.....	{ G.* F.*	10.0 17.3	1.5 2.1	15.0 11.7	Alfalfa, oats, corn, molasses.			
Quaker Oats Co., Chicago, Ill.									
B 5480	Green Cross Horse Feed with molasses.....	{ G.* F.*	10.0 12.5	2.5 9.4	12.0 11.6	Alfalfa meal, oats, oat shorts, oat hulls, oat middlings, corn, molasses, salt.			
B 5766	Green Cross Horse Feed with molasses.....	{ G.* F.*	11.0 14.0	2.6 9.4	13.2 13.2	Same as B 5480 with cottonseed meal.			
Average.....							12.4		
Rosenbaum Bros., Chicago, Ill.									
B 5090	Rosbro Horse Feed Special.....	{ G.* F.*	10.0 13.4	2.0 3.6	15.0 7.0	Alfalfa meal, oats, cracked corn, barley, molasses.			
B 5125	Rosbro Horse Feed Special.....	{ G.* F.*	10.0 16.0	3.6 10.3	3.0 7.3	Same as B 5090.			
B 5172	Rosbro Horse Feed Special.....	{ G.* F.*	10.3 13.9	3.4 9.6	60.00	Same as B 5090.			
Average.....							8.0		
POULTRY FEEDS.									
Amendt Milling Co., Monroe, Mich.									
B 5832	Amco Baby Chick Feed.....	{ G.* F.*	10.0 12.3	2.5 4.0	5.0 2.7	Meat scraps, wheat screenings, oats, cracked corn, kafir corn, milo, millet, grit.			
B 5660	Amco Poultry Mash.....	{ G.* F.*	10.0 15.5	2.5 5.0	6.8 10.0	Linseed meal, gluten feed, meat scraps, wheat bran, wheat middlings, oats, corn, corn feed meal, salt.			
B 5242	Amco Scratch Grains.....	{ G.* F.*	10.0 11.8	2.5 10.4	3.3 4.25	Wheat, kafir corn, milo, buckwheat, barley, screenings.			
B 5243	Amco Scratch Grains.....	{ G.* F.*	10.0 12.4	2.4 10.5	3.6 4.10	Linseed oil cake, wheat, oats, cracked corn, kafir corn, buckwheat, barley, screenings, rye.			
B 5828	Amco Scratch Grains.....	{ G.* F.*	11.4 11.1	2.5 3.0	3.0 4.05	Same as B 5243.			
Average.....							3.3		
American Milling Co., Peoria, Ill.									
B 5305	Cluck Cluck Scratch Feed.....	{ G.* F.*	10.0 11.5	2.4 3.0	5.0 3.5	Wheat, oats, corn, kafir corn, buckwheat, barley.			
B 5829	Cluck Cluck Scratch Feed.....	{ G.* F.*	11.4 12.3	2.3 3.0	3.35 4.35	Same as B 5305 with sunflower and milo.			
Average.....							3.3		
B 5474	Cluck Cluck Scratch Feed with 5% grit.....	{ G.* F.*	10.0 9.7	2.5 11.1	5.0 2.3	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower, screenings, grit.			
B 5348	Tip Top Scratch Feed no grit.....	{ G.* F.*	10.8 11.8	3.3 10.8	3.0 4.0	Wheat, oats, corn, kafir corn, wild buckwheat, barley, sunflower.			

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at.	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
	Aready Farms Milling Co., Chicago, Ill.							
B 5071	Aready Poultry Feed no grit.....	Hudson..... { G.* { F.*	12.1 12.1	9.0 10.0	2.0 3.0	6.0 3.3	\$4.00	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower.
B 963	Atlantic Poultry Feed.....	Brooklyn..... { G.* { F.*	11.8 11.8	10.6 10.6	2.9 3.0	3.0 3.0	4.75	Salvage wheat, wheat, cracked corn, kafir corn, buckwheat, re-cleaned wheat screenings, oats, barley, wild buckwheat, sunflower seed.
B 962	Sunkist Chick Feed.....	Brooklyn..... { G.* { F.*	11.9 11.9	11.4 11.4	2.8 3.1	6.0 3.1	4.75	Wheat, cracked corn, kafir corn, wheat screenings, wild buckwheat, millet seed, hulled oats.
B 964	Sunkist Poultry Feed no grit.....	Brooklyn..... { G.* { F.*	11.5 11.5	10.8 10.8	3.7 3.7	3.7 3.7	4.75	Cracked corn, kafir corn, oats, barley, wild buckwheat, sunflower seed.
	Bad Axe Grain Co., Bad Axe, Mich.							
B 5296	Egg Brand Scratch Feed.....	Bad Axe..... { G.* { F.*	11.8 14.3	12.1 10.8	2.6 3.0	5.1 3.8	4.00	Wheat, oats, cracked corn, buckwheat, barley.
B 5625	Egg Brand Scratch Feed.....	Bad Axe..... { G.* { F.*	11.8 14.3	12.1 10.8	2.6 3.0	5.1 3.8	4.00	Same as B 5296.
	J. J. Badenoeh Co., Benton Harbor, Mich.							
B 5165	Daily Egg Poultry Feed no grit.....	Benton Harbor..... { G.* { F.*	12.1 13.4	10.8 11.0	3.0 3.2	3.3 3.9	4.15	Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5177	Daily Egg Poultry Feed no grit.....	Harford.....	13.4	11.0	3.2	3.9	3.90	Same as B 5165.
B 5560	Daily Egg Poultry Feed no grit.....	Lansing.....	13.9	10.2	3.8	4.0	3.90	Same as B 5165.
	Bad Axe Grain Co., Bad Axe, Mich.							
B 4791	Daily Egg Poultry Feed with grit.....	Average.....	13.1	10.7	3.3	3.7	3.75	Wheat, oats, cracked corn, kafir corn, milo, barley, sunflower, grit, shell.
B 5361	Daily Egg Poultry Feed with grit.....	Average.....	13.1	10.7	3.3	3.7	3.75	Same as B 4791.
	H. W. Baer, Pontiac, Mich.							
B 5562	Sunflower Poultry Feed with grit.....	Lansing..... { G.* { F.*	11.4 12.7	9.9 9.1	2.8 3.5	3.1 3.5	3.80	Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley, sunflower, grit, shell.
B 5876	Baer's Chicken Feed.....	Pontiac..... { G.* { F.*	13.5 13.5	10.4 10.4	1.6 1.6	2.1 2.1	4.45	Wheat, cracked corn, kafir corn, barley, sunflower.
B 5701	Chas. F. Bartlett Co., Grand Rapids, Mich. Economy Egg Producer.....	Coopersville..... { G.* { F.*	9.2 18.9	18.0 18.9	8.0 8.0	19.0 14.5	.....	Linseed meal, gluten feed, meat scraps, alfalfa meal, wheat bran, wheat middlings, rice bran, oat meal mill by-products.

B 5047	Blatchford Calf Meal Co., Waukegan, Ill.	Bar-Nun Laying Mash.....	{ G.* F.*	11.1	80.0	5.0	8.0	4.00	Cottonseed meal, cocoashell, cocoanut meal, meat scraps, fish, bone meal, blood meal, alfalfa meal, wheat bran, oat meal, corn feed, barley meal, limestone, salt.
B 5416		Bar-Nun Laying Mash.....	{ G.* F.*	8.6	18.9	7.6	8.0	4.00	Same as B 5047 without cottonseed meal and blood meal; with oat hulls.
B 5221	Blatchford's Fill the Basket Egg Mash.....	Average.....	{ G.* F.*	9.9	18.8	7.9	10.2	4.50	Cottonseed meal, linseed meal, malt sprouts, barley meal, locust bean meal, beans, peas, flaxseed, rice polish, cocoashell meal, cocoanut meal, meat scraps, fish, bone meal, blood flour, dried milk, alfalfa, wheat flour, wheat bran, wheat middlings, oat meal, corn meal, fowlegreek, anise, capsicum, limestone, salt.
B 5558	Blatchford's Fill the Basket Egg Mash.....	Average.....	{ G.* F.*	9.5	21.3	5.6	9.3	4.28	Same as B 5221.
B 5046	Blatchford's Milk Mash.....	Average.....	{ G.* F.*	9.2	20.1	5.2	9.5	6.00	Cottonseed meal, linseed meal, malt sprouts, barley meal, locust bean meal, beans, peas, flaxseed, rice polish, cocoashell meal, cocoanut meal, meat scraps, fish, bone meal, blood flour, wheat flour, wheat middlings, oat meal, corn meal, fowlegreek, anise, dried milk, limestone, salt.
B 5800	Blatchford's Milk Mash.....	Average.....	{ G.* F.*	8.7	19.8	5.3	5.9	6.00	Same as B 5046.
B 5820	Blatchford's Milk Mash.....	Average.....	{ G.* F.*	9.6	21.1	6.2	6.3	1.10	Same as B 5046 without locust bean meal, fowlegreek, anise.
B 5548	Christian Breisch Co., Lansing, Mich.	Average.....	{ G.* F.*	14.5	10.3	3.3	2.9	4.25	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, rye.
B 5565	Plymouth Rock Scratch Feed.....	Average.....	{ G.* F.*	14.5	10.3	3.3	2.9	4.25	Same as B 5548 with milo.
B 5608	Bronfield & Colvin, Bay City, Mich.	Average.....	{ G.* F.*	14.5	10.3	3.3	2.9	3.75	Wheat, oats, corn, buckwheat, barley, rye.
B 5618	Caro Farmers Cooperative Elevator Co., Caro, Mich.	Average.....	{ G.* F.*	11.9	10.0	2.5	5.0	3.75	Wheat, oats, corn, buckwheat, barley.
B 5606	Cass Bean & Grain Co., Bay City, Mich.	Average.....	{ G.* F.*	14.4	9.8	3.1	2.9	3.75	Wheat, corn, buckwheat, barley.
B 5834	Caughy-Jessman Co., Detroit, Mich.	Average.....	{ G.* F.*	11.8	10.9	2.9	4.0	80.00	Wheat, corn meal, kafir corn, milo, millet, wild seed.
B 5836	Common Sense Baby Chick Feed.....	Average.....	{ G.* F.*	12.6	11.0	2.7	2.4	80.00	Wheat, cracked corn, kafir corn, milo, buckwheat.
B 5841	Common Sense Developing Feed.....	Average.....	{ G.* F.*	40.0	5.0	5.0	8.0	8.00	Lined meal, meat scraps, alfalfa meal, wheat bran, wheat middlings, oats, corn products, oyster shell.

* Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
Caughy-Jessman Co.—Conn.								
B 5339	Common Sense Pigeon Feed No. 4.	Detroit.	{ G.* F.*	11.3 12.5	2.8 2.3	2.7 2.6	.....	Peas, wheat, oats, cracked corn, kafir corn, milo, buckwheat.
B 5337	Common Sense Pigeon Feed No. 6.	Detroit.	{ G.* F.*	11.0 12.3	2.6 2.5	4.0 3.2	.....	Peas, wheat, kafir corn, milo, buckwheat.
B 5325	Common Sense Pigeon Feed No. 6.	Detroit.	{ G.* F.*	12.8 14.5	3.2 3.3	3.3	\$92.00 4.90	Same as B 5337.
		Average.		12.6	2.9	3.3		
Cereal Mills Co., Wausau, Wis.								
B 5217	Common Sense Scratch Feed.	Ypsilanti.	{ G.* F.*	10.0 12.0	2.6 2.6	6.0 4.2	.....	Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5335	Common Sense Scratch Feed.	Detroit.	{ G.* F.*	12.3 10.6	3.6 3.6	3.3	4.25 76.00	Same as B 5217
		Average.		12.2	3.1	3.8		
B 5380	Cenoco Hen Feed.	Crystal Falls.	{ G.* F.*	10.0 12.5	2.6 2.2	5.0 3.1	.....	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower, grit.
B 5611	Chatfield Milling Co., Bay City, Mich.	Bay City.	{ G.* F.*	10.0 11.7	3.6 3.6	7.0 4.9	.....	Oats, corn, buckwheat, barley, shell.
B 5335	Cheboygan Flour Mills Co., Cheboygan, Mich.	Cheboygan.	{ G.* F.*	10.0 11.1	3.6 2.7	4.5 4.5	.....	Wheat, oats, corn, buckwheat, barley, screenings, spelta.
B 5311	Commercial Milling Co., Detroit, Mich.	Detroit.	{ G.* F.*	9.0 10.7	2.4 3.7	4.0 3.5	.....	Wheat, oats, cracked corn, milo, buckwheat, sunflower, screenings
B 5312	Henkel's Poultry Feed.	Detroit.	{ G.* F.*	10.0 13.1	3.8 3.8	4.0 3.9	.....	Wheat, cracked corn, milo, buckwheat, screenings, grit.
B 5366	Henkel's Poultry Feed.	Detroit.	{ G.* F.*	11.8 10.7	3.6 3.6	3.0	4.30	Same as B 5312 with kafir.
		Average.		12.5	3.7	3.5		
B 5306	The G. E. Conkey Co., Cleveland, Ohio.	Detroit.	{ G.* F.*	18.0 10.3	3.0 4.1	4.0	.....	Bone meal, dried buttermilk, wheat middlings, oats, corn meal, corn feed meal.
B 5362	C. E. Du Puy Co., Pontiac, Mich.	Pontiac.	{ G.* F.*	10.0 11.4	2.6 2.0	5.0 2.6	.....	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower.
B 5363	Peerless Scratch Feed.	Pontiac.	{ G.* F.*	11.0 11.8	2.5 2.6	3.0	4.20	Wheat, oats, corn, kafir corn, grit, millet seed.
	Victor Chick Feed.	Pontiac.	{ G.* F.*	11.0	2.6	1.8	4.45	

COMMERCIAL FEEDING STUFFS

Albert Dickinson Co., Chicago, Ill.									
B 5219	Globe Chick Feed no grit.....	{ G.* F.*	12.0	10.0	2.6	5.0	Wheat, oats, corn, kafir corn, millet.		
B 5373	Globe Chick Feed no grit.....		11.0	11.9	3.2	3.0	\$4.00	Same as B 5219.	
	Average.....		11.5	11.7	3.1	3.1	4.45		
B 5556	Globe Chick Mash.....	{ G.* F.*	16.0	16.0	4.0	10.0	Alfalfa meal, dried buttermilk, wheat middlings, oat-flour, corn		
B 5117	Globe Developing Feed no grit.....		10.0	17.8	5.6	6.2	5.00	feed meal, calcium carbonate, salt.	
B 5218	Globe Developing Feed no grit.....	{ G.* F.*	13.0	10.4	2.7	2.6	4.25	Wheat, bulled oats, corn, kafir corn, buckwheat, millet.	
	Average.....		12.5	10.1	2.5	2.6	4.10	Same as B 5117.	
B 5124	Globe Egg Mash.....	{ G.* F.*	20.0	20.0	6.0	10.0	Lined meal, meat scraps, alfalfa meal, wheat bran, wheat mid-		
B 5314	Globe Egg Mash.....		10.1	24.1	5.4	8.2	3.90	dlings, corn feed meal, ground corn, salt.	
	Average.....		10.0	22.2	5.5	8.2	1.90	Same as B 5124 with screenings.	
B 5695	Globe Pigeon Feed no grit.....	{ G.* F.*	12.0	10.0	2.6	5.0	Peas, wheat, kafir, corn, milo, buckwheat, millet, hemp.		
B 5826	Globe Pigeon Feed no grit.....		12.4	14.2	3.3	4.3	5.25	Same as B 5695.	
	Average.....		12.2	14.2	3.3	4.3	5.30		
B 5026	Globe Scratch Feed no grit.....	{ G.* F.*	12.0	10.0	2.6	5.0	Lined oil cake, wheat, oats, corn, kafir corn, buckwheat, barley		
B 5122	Globe Scratch Feed no grit.....		11.3	11.3	2.8	3.0	4.50	sundowner.	
B 5220	Globe Scratch Feed no grit.....	{ G.* F.*	11.5	10.0	2.4	3.6	3.80	Same as B 5026.	
B 5373	Globe Scratch Feed no grit.....		12.4	12.1	2.9	3.0	4.00	Same as B 5026.	
B 5415	Globe Scratch Feed no grit.....	{ G.* F.*	11.7	11.3	2.8	3.2	4.15	Same as B 5026.	
	Average.....		11.9	11.5	2.7	3.2	4.99		
B 5372	Globe Scratch Feed with grit.....	{ G.* F.*	11.5	10.0	2.6	5.0	Lined oil cake, wheat, oats, corn, kafir corn, barley, broom corn,		
B 5694	King Pigeon Feed no grit.....		11.1	11.1	3.0	2.4	4.00	grit.	
B 5120	Pine Tree Scratch Feed no grit.....	{ G.* F.*	12.5	10.6	3.2	2.0	4.85	Peas, wheat, corn, kafir corn, milo, buckwheat, millet, hemp.	
B 5315	Pine Tree Scratch Feed no grit.....		12.0	10.3	2.9	2.4	3.75	Wheat, oats, corn, kafir corn, buckwheat, barley.	
	Average.....		11.7	10.7	2.8	3.1	4.10	Same as B 5120.	
B 5123	Pine Tree Scratch Feed with grit.....	{ G.* F.*	12.3	11.0	2.9	3.3	Wheat, oats, corn, kafir corn, buckwheat, barley, broom corn, grit.		
B 5507	Pine Tree Scratch Feed with grit.....		11.6	10.6	2.5	3.5	3.50	Wheat, broom corn, oats, corn, kafir corn, buckwheat, barley,	
	Average.....		10.8	10.6	2.5	3.6	3.85	grit.	

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at.	Moisture.	Crude Protein.	Crude Fat.	Crude Fiber.	Price per ton or cwt.	Principal ingredients identified.
Albert Dickson Co.—Con.								
B 5512	Queen Poultry Mash.	Marquette..... { G.* F.*	9.7	11.0 14.8	2.5 3.8	10.0 10.7	\$3.90	Lined meal, meat scraps, alfalfa meal, wheat bran, wheat middlings, shorts, corn meal, corn bran.
B 5827	Rival Scratch Feed no grit.	Detroit..... { G.* F.*	12.6	9.5 11.1	2.6 2.8	6.0 2.7	4.05	Wheat, oats, corn, kafir corn, milo, barley.
B 5121	Rival Scratch Feed with grit.	Muskegon..... { G.* F.*	11.2	9.5 10.4	2.6 3.4	6.0 4.2	.....	Wheat, oats, corn, kafir corn, barley, grit.
B 5342	Rival Scratch Feed with grit.	Manistique..... { G.* F.*	10.4	10.8 10.8	2.9 4.1	4.1	4.50	Same as B 5121.
Dodge Hooker Mills, Wausau, Wis.								
B 5355	Egg Maker Dry Mash.	Escanaba..... { G.* F.*	10.4	17.0 19.4	4.0 5.5	10.0 9.0	1.45	Lined meal, hominy meal, meat scraps, bone meal, alfalfa meal, wheat bran, wheat middlings, corn meal, barley meal.
B 5346	Wisconsin Poultry Ration no grit.	Gladstone..... { G.* F.*	12.2	10.0 10.8	2.5 2.3	6.0 2.9	3.75	Wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower.
Easley Milling Co., Plainwell, Mich.								
B 5495	Pure Gold Scratch Feed.	Plainwell..... { G.* F.*	11.0	10.0 10.2	2.5 4.0	5.0 4.3	75.00	Wheat, oats, cracked corn, kafir corn, buckwheat, barley.
O. Gandy & Co., South Whitney, Ind.								
B 5008	Standard A Poultry and Chick Feed.	Marshall..... { G.* F.*	12.0	9.5 11.3	2.5 2.5	5.0 2.8	4.50	Wheat, oats, corn, kafir corn, buckwheat, barley, screenings, millet.
B 5024	Standard A Poultry and Chick Feed.	Coldwater..... { G.* F.*	12.1	11.1 11.1	2.7 3.0	2.5 3.1	4.25	Same as B 5008 without screenings, millet.
B 5176	Standard A Poultry and Chick Feed.	Watervliet..... { G.* F.*	11.7	10.4 10.4	3.0 3.0	2.5 2.5	4.00	Same as B 5008 without screenings and with weed seeds.
Hales & Hunter Co. (formerly Hales & Edwards Co.), Chicago, Ill.								
B 5042	Cackle Fine Chick with grit.	Stockbridge..... { G.* F.*	11.2	10.0 9.4	2.5 2.2	5.0 1.4	4.50	Wheat, cracked corn, kafir corn, millet, grit.
B 5111	Cackle Poultry Feed no grit.	Muskegon..... { G.* F.*	12.1	10.0 11.1	2.5 3.1	5.0 3.9	3.90	Wheat, oats, cracked corn, kafir corn, barley, sunflower.
B 4870	Cackle Poultry Feed with grit.	Grand Rapids..... { G.* F.*	11.7	10.5 10.5	2.5 3.0	5.0 3.3	3.55	Wheat, oats, cracked corn, kafir corn, barley, sunflower, grit, shell.
B 5187	Cackle Poultry Feed with grit.	St. Joseph..... { G.* F.*	11.8	10.4 10.4	2.5 2.5	5.0 2.3	3.70	Same as B 4870.
B 5490	Cackle Poultry Feed with grit.	Ashton..... { G.* F.*	10.3	10.3 10.3	3.3 3.3	2.4	.....	Same as B 4870 with buckwheat.
College Laying Mash.								
B 5151	College Laying Mash.	Holland..... { G.* F.*	9.8	18.0 18.5	4.0 4.2	10.0 9.0	4.15	Gluten feed, meat scraps, alfalfa meal, wheat bran, wheat middlings, ground oats, corn feed meal, salt, shell.
B 4000	College Scratch Feed no grit.	Grand Rapids..... { G.* F.*	12.3	10.8 10.8	2.7 2.7	4.2	3.60	Wheat, oats, cracked corn, kafir corn, buckwheat, barley.

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B 5099	College Scratch Feed no grit.	Jackson	12.1	11.7	3.0	4.6	3.75	Same as B 4669.
B 5423	College Scratch Feed no grit.	Cadillac	12.2	10.5	3.1	2.5	74.00	Same as B 4669.
		Average	12.2	11.0	2.9	3.8		
B 4668	College Scratch Feed with grit.	Grand Rapids		10.0	2.5	5.0		Wheat, oats, cracked corn, kafir corn, buckwheat, barley, grit.
B 5009	College Scratch Feed with grit.	Marshall	11.3	10.9	2.8	4.5	3.45	Same as B 4668.
		12.0	10.2	2.9	4.0	4.50		
		Average	11.7	10.6	2.9	4.3		
B 1359	Morning Glory Fine Chick no grit.	Grand Rapids		10.0	2.5	5.0		Cracked wheat, corn, milo, steel cut oats.
		12.4	9.8	2.6	1.5	81.00		Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley.
B 5830	Morning Glory Scratch Feed no grit.	Detroit	12.0	11.1	3.0	3.2	4.35	Corn feed meal, oat flour, barley flour, wheat middlings, corn gluten feed, meat scraps, bone flour, alfalfa flour, dried buttermilk, calcium carbonate, salt.
B 1360	Red Comb Chick Mash with dried buttermilk.	Grand Rapids	10.1	17.1	4.3	4.3	94.00	Same as B 1360.
B 5890	Red Comb Chick Mash with dried buttermilk.	Redford	10.2	16.4	5.2	5.9		
		Average	10.2	16.8	4.8	5.1		
B 5770	Red Comb Fine Chick Feed.	Niles		10.0	2.5	5.0		Wheat, oats, cracked corn, kafir corn.
B 5389	Red Comb Fine Chick Feed.	Redford	13.3	11.0	2.4	1.8		Same as B 5770.
		11.9	10.7	2.6	1.9			
		Average	12.6	10.9	2.5	1.9		
B 4667	Red Comb Mash Feed with dried buttermilk and abel.	Grand Rapids		15.0	4.0	9.0		Lineed meal, meat scraps, alfalfa meal, wheat bran, wheat middlings, ground oats, corn feed meal, dried buttermilk, salt, grit.
B 5076	Red Comb Mash Feed with dried buttermilk and abel.	Hudson	10.1	21.6	5.4	7.3	4.10	Same as B 4667.
B 5098	Red Comb Mash Feed with dried buttermilk and abel.	Jackson	9.5	18.4	5.0	8.5	4.50	Same as B 4667 without salt.
B 5153	Red Comb Mash Feed with dried buttermilk and abel.	Holland	9.2	19.6	4.6	7.4	4.15	Same as B 4667 without salt.
B 5549	Red Comb Mash Feed with dried buttermilk and abel.	Laansing	9.9	19.9	4.8	8.5	4.15	Same as B 4667 without salt.
		10.5	19.8	5.1	6.2	4.50		
		Average	7.8	18.7	5.0	7.6		
B 5075	Red Comb Poultry Feed no grit.	Hudson		10.0	2.5	5.0		Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower.
B 5214	Red Comb Poultry Feed no grit.	Ypsilanti	11.4	11.1	3.2	3.3	4.50	Same as B 5075.
		11.8	11.3	2.9	3.3	4.25		
		Average	11.6	11.2	3.1	3.3		
B 5110	Red Comb Scratch Feed with grit.	Muskegon	11.9	10.0	2.5	5.0	3.95	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower, grit, shell.
		11.3	11.3	2.8	3.2			
B 5422	Scratch Feed	Cadillac		10.0	2.5	5.0		Wheat, oats, corn, buckwheat, sunflower, wheat screenings.
B 5463	Scratch Feed	Mt. Pleasant	10.6	11.1	3.1	4.1	80.00	Same as B 5432.
		10.5	10.8	3.5	6.1	3.95		
		Average	10.6	11.0	3.3	5.1		

Harris Milling Co., Mt. Pleasant, Mich.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at.	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5350 B 5355	Hewitt Grain & Provision Co., Escanaba, Mich. Hewitt's Magnolia Scratch Feed no grit. Hewitt's Magnolia Scratch Feed with grit.	Escanaba. Lebanon. Average. { G.* F.*	12.0	10.0	2.5	5.0	...	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower.
			11.5	11.5	2.8	3.6	\$3.65	Same as B 5350.
			11.6	11.9	3.0	3.6	40.00	
			11.8	11.7	2.9	3.6		
B 5344 B 5385	Hewitt's Magnolia Scratch Feed with grit. Hewitt's Magnolia Scratch Feed with grit.	Manistique. Iron River. Average. { G.* F.*	11.7	10.0	2.5	5.0	...	Wheat, oats, corn, kafir corn, buckwheat, barley, grit.
			11.3	11.3	2.7	3.5	3.80	Same as B 5385.
			11.8	10.5	2.9	3.4	3.65	
			11.8	10.9	2.8	3.5		
B 5388 B 5392	The H-O Company, Buffalo, N. Y. The H-O Co.'s Steam Cooked Chick Feed The H-O Co.'s Steam Cooked Chick Feed	Redford. Royal Oak. Average. { G.* F.*	10.3	12.0	3.0	6.0	...	Wheat, oats, cracked corn, kafir corn.
			12.4	12.4	3.5	1.4	...	Same as B 5388.
			13.0	11.4	2.3	1.1	35.30	
			11.7	11.9	2.9	1.3		
B 5073 B 5106 B 947 B 5004 B 5020 B 5231 B 5436 B 5465	The Chas. A. Krause Milling Co., Milwaukee, Wis. Badger De Lux Scratch Feed no grit. Badger Laying Mash. Blue Top Chick Feed. Blue Top Scratch Feed no grit. Blue Top Scratch Feed no grit. Blue Top Scratch Feed no grit. Blue Top Scratch Feed no grit. Blue Top Scratch Feed no grit.	Port Huron. Muskegon. Northville. Albion. Bogor. Plymouth. Holland. Detroit. Average. { G.* F.*	14.1	9.0	9.5	5.0	...	Wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower.
			13.0	13.0	5.5	1.5	4.50	Heminy feed, meat scraps, alfalfa meal, wheat bran, wheat middlings, maize, red dog flour, corn germ meal, corn feed meal.
			10.4	19.9	5.5	2.2	4.30	Cracked corn, cracked wheat, cracked kafir corn or milo, millet, grit.
			12.4	9.5	5.2	1.2	4.50	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower.
			12.4	9.0	5.2	1.2	4.50	
			12.6	11.9	2.7	3.3	4.50	Same as B 5004.
			11.8	10.4	2.5	2.9	4.75	Same as B 5004.
			12.3	10.4	1.8	2.9	4.75	Same as B 5004 with wild buckwheat.
			11.8	11.1	3.0	3.6	4.10	Same as B 5004 with milo.
			14.1	10.1	3.1	2.4	4.10	
			12.6	10.8	2.6	3.3		
			9.0	9.0	2.6	5.0	...	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower, grit.
B 5321 B 1260 B 5499 B 948	Blue Top Scratch Feed with grit. Krause Chick Feed with grit. Krause Developing Feed no grit. Krause Scratch Feed no grit.	Munising. Grand Rapids. Plainwell. Northville. { G.* F.*	11.0	10.6	1.8	2.8	4.25	Cracked wheat, corn, kafir corn, millet, grit.
			9.0	9.0	1.5	4.0	4.35	Wheat, cracked corn, kafir corn, milo, buckwheat, millet.
			10.2	9.3	2.4	1.9	...	Wheat, corn, kafir corn or milo, barley, oats, buckwheat, sunflower, millet.
			11.3	9.8	2.0	3.0	...	
			14.2	9.8	2.0	2.0	4.25	

B 5103	Krause Scratch Feed no grit.....	Muskegon.....	12.5	10.7	1.8	2.8	4.30	Same as B 948 without millet.
	The Ladish Milling Co. (formerly Stratton-Ladish Milling Co.) Milwaukee Wis.	Average.....	13.3	10.3	1.8	2.7		
B 5680	National Scratch Feed.....	{ G.* F.*	9.5	9.5	2.5	5.0		Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley.
B 5604	Record Maker Chick Feed no grit.....	{ G.* F.*	13.3	10.8	3.8	3.8	4.00	Wheat, cracked corn, kafir corn, millet.
B 5683	Record Maker Chick Feed no grit.....	{ G.* F.*	14.2	10.7	3.8	1.9	5.00	Same as B 5664 with milo.
		Average.....	14.1	10.9	4.2	1.9	4.00	
B 5895	True Value Chick Feed.....	{ G.* F.*	14.2	10.8	4.0	1.9		Wheat, oat groats, cracked corn, kafir corn, milo, millet.
B 5683	True Value Developer.....	{ G.* F.*	13.5	11.1	3.6	2.2	4.25	Meat scraps, wheat, oat groats, cracked corn, kafir corn, milo, buckwheat, barley.
B 5681	True Value Poultry Mash.....	{ G.* F.*	14.3	11.3	2.6	2.1	4.10	Lined meal, gluten feed, meat scraps, alfalfa meal, wheat bran
B 5896	True Value Poultry Mash.....	{ G.* F.*	10.6	23.1	4.6	10.8	4.10	wheat middlings, oats, corn feed meal, salt.
		Average.....	11.1	21.9	4.8	9.2	4.25	Same as B 5681.
B 5527	True Value Scratch Feed.....	{ G.* F.*	10.9	22.5	4.7	10.0		Wheat, oats, cracked corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5897	True Value Scratch Feed.....	{ G.* F.*	11.3	9.8	3.0	3.6	4.05	Same as B 5527.
	McMillen Co. Fort Wayne Ind.	Average.....	13.8	10.3	2.8	2.0		
B 5872	Wayne Scratch Feed.....	{ G.* F.*	12.6	10.1	2.9	2.8		Wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower.
	Mt. Clemens Milling Co. Mt. Clemens, Mich.	Average.....	11.0	11.4	3.5	2.9	3.00	
B 5688	Peerless Scratch Feed.....	{ G.* F.*	9.8	9.8	2.5	4.5		Wheat, oats, corn, buckwheat, barley.
	New Richmond Roller Mills, New Richmond, Wis.	{ G.* F.*	14.0	11.3	3.4	3.2	4.50	
B 5519	Egg-Em-On Scratch Feed with grit.....	{ G.* F.*	11.0	11.1	3.0	2.9		Wheat, oats, cracked corn, kafir corn, barley, sunflower, grit.
B 5522	Egg-Em-On Scratch Feed with grit.....	{ G.* F.*	9.9	13.9	3.0	3.4	4.25	Same as B 5519.
	Northrup, King & Co., Minneapolis, Minn.	Average.....	10.5	12.5	3.0	3.7	4.00	
B 5243	Special Scratch Feed no grit.....	{ G.* F.*	10.0	10.0	2.5	5.0		Wheat, oats, corn, milo, buckwheat, barley, broom corn.
B 5492	Special Scratch Feed no grit.....	{ G.* F.*	11.5	11.5	4.7	4.0		Same as B 5243 with weed seeds, without broom corn.
B 5503	Special Scratch Feed no grit.....	{ G.* F.*	13.1	13.7	2.7	5.0	4.00	Same as B 5243 with opals.
		Average.....	11.2	10.9	2.8	3.1	4.00	
		Average.....	11.9	12.0	3.4	4.0		

*Abbreviations for Guaranteed and Found.

B 5529	Pontiac Scratch Feed	Jackson	10.9	10.4	3.1	3.3	\$4.50	Same as B 5077 with broom corn.
		Average	11.6	10.3	3.2	3.6		
B 5016	Red Ribbon Chick Feed	Bronson	13.2	11.1	4.6	5.0	4.25	Wheat, oats, cracked corn, kafir corn, milo, millet.
B 1326	Red Ribbon Chick Feed	Hastings	13.6	11.3	3.3	1.4	4.50	Same as B 5016.
B 1370	Red Ribbon Chick Feed	Hastings	11.8	10.6	3.1	1.5		Same as B 5016.
		Average	12.9	11.0	3.7	1.8		
B 5017	Screened Scratch Feed	Bronson	12.5	10.5	2.5	3.7	4.25	Wheat, oats (trace), cracked corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5127	Screened Scratch Feed	Muskegon	12.3	11.1	2.7	3.9	4.25	Same as B 5017.
B 5488	Screened Scratch Feed	Kalamazoo	12.1	11.0	2.9	3.1	4.00	Same as B 5017.
		Average	12.3	10.9	2.7	3.6		
B 5580	Peninsula Scratch Feed no grit.	Flint	12.4	10.9	2.6	3.8	4.50	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower, wheat screenings, rye.
B 5578	Peninsula Scratch Feed with grit.	Flint	12.6	11.4	3.0	4.2	4.30	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower, wheat screenings, shell.
B 5108	Red Crown Scratch Feed no grit.	Muskegon	11.9	11.1	3.3	3.9	3.75	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower, weed seeds.
B 5107	Red Crown Scratch Feed with grit.	Muskegon	11.7	10.1	3.2	3.0	3.50	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower, grit.
B 5756	Pratt Food Company, Chicago, Ill.	Paw Paw	10.7	11.5	5.2	5.8		Bone meal, wheat (cooked), wheat middlings, oat middlings, rape, epson salts, oat meal, corn meal, millet, shell meal.
B 5298	Purina Mills, Ralston Purina Co., St. Louis, Mo.	Vassar	9.8	19.0	4.0	10.0		Lined meal, gluten feed, meat granulated, alfalfa meal, wheat bran, wheat middlings, corn meal, salt.
B 5740	Purina Chicken Chowder.	Battle Creek	10.4	18.9	4.3	10.5	4.85	Same as B 5289 with charcoal.
		Average	10.1	19.5	4.1	10.0	4.90	
B 4685	Purina Chicken Fatena	Grand Rapids	9.4	16.5	6.6	5.8	84.00	Lined meal, wheat middlings, ground oats, ground corn, kafir meal, barley meal, corn germ meal.
B 5063	Purina Chicken Fatena	Reading	9.5	13.5	6.4	7.0	3.45	Same as B 4685.
		Average	9.5	15.0	6.5	6.4		
B 5290	Purina Scratch Feed	Vassar	11.3	11.0	3.0	3.1	4.40	Wheat, corn, kafir corn, milo, buckwheat, barley, sunflower.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—Continued.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
Quaker Oats Co., Chicago, Ill.								
B 5048	Big Egg Scratch Feed no grit	Jackson, { G. P.	12.1	10.1	2.6	5.0	84.30	Wheat, oats, cracked corn, kafir corn, milo, barley, sunflower.
B 5203	Big Egg Scratch Feed no grit	Grand Lake.....	13.2	10.4	2.4	2.8	4.25	Same as B 5048 with broom corn.
		Average.....	12.7	10.3	2.3	2.8		
B 1333	Ful-O-Pop Dry Mash	Comstock Park, { G. P.	9.7	21.9	5.7	7.2	4.60	Meat scraps, fish meal, oat meal, alfalfa meal, wheat bran and screenings, bone meal, cottonseed meal, yellow hominy feed, hominy, corn gluten feed, ground grain screenings.
B 4660	Ful-O-Pop Dry Mash	Grand Rapids.....	10.2	21.0	5.3	7.3	4.30	Same as B 1333 without yellow hominy feed, with wheat middlings and screenings.
B 5420	Ful-O-Pop Dry Mash	Traverse City.....	8.7	21.9	5.8	8.2	85.00	Same as B 1333 without yellow hominy feed.
		Average.....	9.5	21.6	5.6	7.6		
B 5035	Ful-O-Pop Growing Mash	St. Johns..... { G. P.	9.5	20.2	5.5	4.1	2.30	Gluten feed, hominy feed, meat scraps, fish, bone meal, alfalfa meal, puffed wheat, wheat bran, oat meal, puffed corn, screenings not ex. mill run.
B 5060	Ful-O-Pop Growing Mash	Brooklyn.....	9.3	19.1	4.8	3.9	4.50	Same as B 5035 without wheat bran, with wheat middlings.
		Average.....	9.4	19.7	5.2	4.0		
B 955	Pansy Little Chick Feed	Ann Arbor..... { G. P.	12.3	10.9	4.5	2.1	4.50	Cracked wheat, cracked kafir and milo, whole millet seed, oat meal, wild buckwheat, wild seed occurring in above seeds and grains, charcoal.
B 1273	Pansy Little Chick Feed	Zeland.....	12.1	10.4	3.0	2.4		Same as B 955 with Indian corn.
B 1364	Pansy Little Chick Feed	Zeland.....	12.8	13.9	5.0	2.3		Same as B 955 with Indian corn.
B 1367	Pansy Little Chick Feed	Zeland.....	12.1	11.5	5.0	2.3		Same as B 955 with Indian corn.
		Average.....	12.3	11.7	4.4	2.3		
B 5686	Quaker Scratch Grains	Mt. Clemens..... { G. P.	11.8	10.6	2.0	3.0		Wheat, corn, kafir corn, milo, buckwheat, barley, sunflower.
	Reese & Seaber Co., Ironwood, Mich.							
B 5391	Roseco Scratch Feed with grit	Ironwood..... { G. P.	10.2	11.0	2.7	3.3	3.85	Wheat, oats, corn, kafir corn, milo, barley, speltz, broom corn, grit.
B 5510	Roseco Scratch Feed with grit	Marquette.....	11.7	11.1	3.0	3.9	4.00	Same as B 5391 with linseed meal, buckwheat, sunflower.
		Average.....	11.0	11.1	2.9	3.6		
B 5264	Rosebro Scratch Feed no grit	Rosebush Bros., Chicago, Ill.						Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower.
		Orosco..... { G. P.	12.0	10.9	2.8	3.3	4.15	

B 1302	Vitality Chick Mash with milk albumen.....	Zeeland.....	{ G.* F.*	16.0 11.6	4.0 4.0	8.0 5.3	..... \$4.50	Milk albumen, ground oats, ground barley, corn feed meal, flour, middlings, old process linseed oil meal, alfalfa meal, bone meal, calcium carbonate. Same as B 1302.
B 5766	Vitality Chick Mash with milk albumen.....	Niles.....	{ G.* F.*	11.9 16.1	4.1 4.1	5.6 5.6	..... .....	Same as B 1302.
	Average.....			11.8	14.4	4.1	5.5	
B 5268	Vitality Egg Mash with milk albumen.....	Holly.....	{ G.* F.*	18.0 9.2	4.0 4.3	10.0 9.5	..... 4.50	Lined meal, meat scraps, bone meal, alfalfa meal, wheat bran, wheat middlings, milk albumen, oats, corn feed meal, barley, calcium carbonate. Same as B 5268.
B 5451	Vitality Egg Mash with milk albumen.....	Grand Rapids.....	{ G.* F.*	9.8 20.2	5.2 5.2	9.3 9.3	4.25	Same as B 5268.
B 5462	Vitality Egg Mash with milk albumen.....	Kalamazoo.....	{ G.* F.*	10.3 21.8	5.0 5.0	7.8 7.8	..... .....	Same as B 5268.
	Average.....			9.8	20.3	4.8	8.9	
B 5464	Vitality Pigeon Feed no grit.....	Kalamazoo.....	{ G.* F.*	11.4 11.7	3.3 3.3	3.4 3.4	..... .....	Pesa, wheat, hemp seed, millet seed, cracked corn, kafir corn, buckwheat.
B 5255	Vitality Scratch Feed no grit.....	Orosco.....	{ G.* F.*	11.7 10.8	2.9 2.9	3.0 3.0	3.00	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower.
B 5433	Vitality Scratch Feed no grit.....	Kalamazoo.....	{ G.* F.*	11.3 10.8	2.7 2.7	3.0 3.0	..... .....	Same as B 5255 without sunflower.
	Average.....			11.5	10.8	2.8	3.0	
B 5092	Vitality Scratch Feed with grit and shell.....	Jackson.....	{ G.* F.*	11.1 10.5	2.6 2.6	2.6 2.6	4.15	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower, grit, shell.
B 1346	Will Pay Scratch Feed with grit.....	Sparta.....	{ G.* F.*	13.0 10.0	3.4 3.4	2.5 2.5	3.70	Wheat, sifted cracked corn, kafir corn, barley, oats, sunflower seed, grit, shell.
B 4695	Will Pay Scratch Feed with grit.....	Grand Rapids.....	{ G.* F.*	12.2 10.3	2.8 2.8	2.8 2.8	3.60	Same as B 1346.
	Average.....			12.6	10.2	3.1	2.7	
B 4698	77 Scratch Feed no grit.....	Grand Rapids.....	{ G.* F.*	12.6 10.9	2.7 2.7	4.1 4.1	3.85	Wheat, oats, cracked corn, kafir corn, buckwheat, barley.
B 5093	77 Scratch Feed no grit.....	Jackson.....	{ G.* F.*	13.3 11.1	3.0 3.0	4.4 4.4	4.06	Same as B 4698.
	Average.....			14.0	11.0	2.9	4.3	
B 4697	77 Scratch Feed with grit.....	Grand Rapids.....	{ G.* F.*	12.1 10.9	2.6 2.6	3.9 3.9	3.50	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, grit.
B 4900	77 Scratch Feed with grit.....	Springport.....	{ G.* F.*	11.4 10.7	2.7 2.7	3.1 3.1	4.50	Same as B 4697.
B 5094	77 Scratch Feed with grit.....	Jackson.....	{ G.* F.*	11.3 10.8	2.7 2.7	4.0 4.0	3.70	Same as B 4697.
	Average.....			11.6	10.8	2.6	3.7	
B 5793	Rosendall's Special Egg Mash.....	Grand Rapids.....	{ G.* F.*	9.9 24.3	5.0 5.1	5.3 5.3	4.50	Lined meal, meat scraps, alfalfa meal, wheat bran, wheat middlings, corn meal, salt.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5381	Ryde & Company, Chicago, Ill.	Crystal Falls	{ G.* F.*	{ 20.0 19.5	{ 4.0 4.8	{ 9.0 10.4	{ \$4.75	Cottonseed meal, linseed meal, beans, cocoashell meal, coconut meal, meat scraps, fish, bone meal, alfalfa meal, wheat bran, wheat middlings, oat meal, corn feed meal, dried milk, fenugreek, anise, salt.
B 5345	Rydes Egg Mash.	Cadillac.	{ F.*	{ 20.0	{ 5.3	{ 11.6	{ 82.00	Same as B 5381 with peas and blood meal.
B 5599	Saginaw Milling Co., Saginaw, Mich.	Average.	{ F.*	{ 19.8	{ 5.1	{ 11.0	{ 4.60	Peas, wheat, corn, kafir corn, buckwheat, millet.
B 5598	Ogemaw AA Pigeon Feed.	Saginaw.	{ G.* F.*	{ 14.0 14.0	{ 3.2 3.6	{ 4.0 3.6	{ 4.60	Wheat, corn, kafir corn, millet.
B 5595	Red Hen Chick Starter.	Saginaw.	{ G.* F.*	{ 17.0 17.3	{ 2.6 3.3	{ 5.0 2.2	{ 82.00	Linseed meal, meat scraps, alfalfa meal, wheat bran, wheat middlings, corn meal.
B 5262	Red Hen Dry Mash.	Saginaw.	{ G.* F.*	{ 16.5 19.5	{ 5.6 5.6	{ 7.1 5.0	{ 70.00	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sunflower.
B 5570	Red Hen Scratch Feed.	Fenton.	{ G.* F.*	{ 12.0 10.4	{ 3.4 3.4	{ 3.4 3.4	{ 4.50	Same as B 5262 without kafir corn.
B 5577	Red Hen Scratch Feed.	Flint.	{ G.* F.*	{ 12.8 10.8	{ 3.0 3.0	{ 3.3 3.3	{ 4.15	Same as B 5262 without kafir corn.
B 5600	Red Hen Scratch Feed.	Flint.	{ G.* F.*	{ 12.9 11.1	{ 3.0 3.4	{ 3.4 3.4	{ 4.15	Same as B 5262 without kafir corn.
B 5597	Wolverine Scratch Feed.	Saginaw.	{ G.* F.*	{ 13.3 10.1	{ 2.6 2.6	{ 2.9 2.9	{ 78.00	Same as B 5262 without kafir corn, barley.
B 5576	Red Hen Scratch Feed with grit.	Flint.	{ G.* F.*	{ 9.5 9.8	{ 2.7 2.7	{ 2.9 2.9	{ 4.05	Wheat, oats, corn, buckwheat, barley, sunflower, grit.
B 5697	Schouren & Meek, Detroit, Mich.	Saginaw.	{ G.* F.*	{ 9.4 10.4	{ 2.6 3.0	{ 3.0 2.9	{ 75.00	Wheat, oats, corn, kafir corn, buckwheat, barley, screenings.
B 5690	Eagle Pigeon Feed.	Detroit.	{ G.* F.*	{ 11.0 14.2	{ 2.6 3.1	{ 4.0 2.8	{ 2.8	Peas, wheat, kafir corn, milo, buckwheat.
B 5692	Eagle Scratch Feed.	Detroit.	{ G.* F.*	{ 10.0 11.3	{ 2.6 3.5	{ 5.0 2.8	{ 2.8	Wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower, screenings.
B 5443	Standard Grocer & Milling Co., Holland, Mich.	Holland.	{ G.* F.*	{ 10.0 10.1	{ 2.6 2.8	{ 5.0 2.7	{ 3.90	Wheat, oats, corn, kafir corn, barley, grit.
B 954	Skethridge Elevator Co., Jackson, Mich.	Jackson.	{ G.* F.*	{ 10.0 10.7	{ 2.6 3.0	{ 5.0 4.3	{ 3.80	Wheat, cracked corn, barley, oats, buckwheat.
	Seeo Scratch Grains without grit.		{ F.*	{ 10.7	{ 3.0	{ 4.3	{ 3.80	

B 5333	Thunder Bay Milling Co., Alpena, Mich. Thunder Bay Scratch Feed no grit.....	Alpena.....	{ G.* F.* }	10.8 10.7	3.0 3.5	3.8 4.5	Wheat, oats, corn, kafir, buckwheat, barley, wheat screenings, rye.
B 5233	Toledo Grain & Milling Co., Toledo, Ohio. Campe Red Ball Scratch Feed.....	Morenci.....	{ G.* F.* }	10.0 10.4	2.5 3.0	5.0 3.0	Wheat, oats, cracked corn, kafir corn, buckwheat, barley, sundr. w.
B 5809	Tomlinson & Watson, Detroit, Mich. Red Bird Scratch Feed no grit.....	Detroit.....	{ G.* F.* }	10.0 11.4	2.5 4.1	5.0 3.2	Linseed oil cake, wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5425	Traverse City Milling Co., Traverse City, Mich. Ideal Poultry Feed.....	Traverse City.....	{ G.* F.* }	10.0 10.2	2.5 3.0	5.0 3.2	Wheat, corn, buckwheat.
B 5749	Voigt Milling Co., Grand Rapids, Mich. V Scratch Feed.....	Belding.....	{ G.* F.* }	9.5 9.8	2.5 3.7	5.0 2.9	Wheat, oats, corn, kafir corn, milo, buckwheat, barley, sunflower.
B 5590	Webbott Grain Co., Saginaw, Mich. Fortune Scratch Feed.....	Saginaw.....	{ G.* F.* }	10.0 11.3	2.0 3.0	4.2 4.5	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower.
B 5394	Washburn Crosby Co., Minneapolis, Minn. North Star Scratch Feed.....	Ontonagon.....	{ G.* F.* }	10.0 11.0	2.5 2.3	10.0 3.4	Wheat, oats, kafir corn, buckwheat, barley, grit, shell, broom corn.
B 1343	Watson Higgins Milling Co., Grand Rapids, Mich. Perfection Scratch Feed.....	Sparta.....	{ G.* F.* }	9.0 10.8	2.0 2.8	8.0 3.3	Kafir, buckwheat, wheat, barley, corn, oats, sunflower.
B 4682	Perfection Scratch Feed.....	Comstock Park.....		12.8	10.4	2.9	Same as B 1343 without sunflower.
B 5143	Perfection Scratch Feed.....	Grand Rapids.....		13.1	10.3	2.6	Same as B 1343 without sunflower.
B 5410	Perfection Scratch Feed.....	Grand Ledge.....		9.9	10.4	3.1	Same as B 1343 without sunflower.
B 1361	Perfection Chick Feed.....	Average.....		12.2	10.5	2.9	Kafir, wheat, corn.
B 5131	E. L. Wellman Co., Grand Rapids, Mich. Qualified Poultry Feed no grit.....	Grand Rapids.....	{ G.* F.* }	10.0 9.4	2.5 2.6	5.0 1.2	Wheat, oats, kafir corn, milo, barley, cracked Indian corn, broom corn.
B 5365	Wells-Olsen Milling Co., De Pere, Wis. Bay City Scratch Feed.....	Jamestown.....	{ G.* F.* }	10.0 10.4	2.5 2.2	5.0 2.5	Wheat, screenings, oats, corn, kafir corn, buckwheat, barley.
B 5398	Bay City Scratch Feed.....	Menominee Iron River.....	{ G.* F.* }	10.0 10.7	2.5 2.9	5.0 3.7	Same as B 5365 with grit.
B 5601	Wenona Flour Mills, Bay City, Mich. Wenona Scratch Feed.....	Average.....		12.4	10.2	2.9	Peas, wheat, oats, corn, buckwheat, barley, rye.
		Bay City.....	{ G.* F.* }	9.5 10.0	2.7 2.3	3.3 3.0	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5252	C. C. Wright, Owosso, Mich. Wright's Mixture.....	{ G. F. }	12.1	10.0 10.5	2.5 3.9	5.0 3.1	\$1.80	Wheat, oats, corn, kafir corn, buckwheat, barley, sunflower.
B 5773	Young Randolph Seed Co., Owosso, Mich. Victory Scratch Feed with grit.....	{ G. F. }	11.9	10.0 9.9	2.5 2.6	5.0 3.9		Wheat, oats, cracked corn, buckwheat, barley, pearl grit.
B 971	Wolverine Chick Feed.....	{ G. F. }	10.9	10.0 11.6	3.0 3.2	5.0 3.8	5.00	Cracked corn, steel cut barley, millet seed.
B 972	Wolverine Scratch Feed.....	{ G. F. }	10.6	10.0 10.8	3.0 3.1	5.0 5.1	4.50	Cracked corn, oats, buckwheat, barley, sunflower.
CORN AND OATS FEEDS.								
B 5336	Cheboygan Flour Mills Co., Cheboygan, Mich. Chop Feed.....	{ G. F. }	11.4	10.7 10.5	6.6 3.8	6.1 4.5	3.30	Ground wheat, oats, corn, barley.
B 5338	Corn Chop.....	{ G. F. }	10.8	10.2 10.3	6.6 4.3	4.4	3.30	Corn.
B 5052	Commercial Milling Co., Detroit, Mich. Henkels Chop Feed.....	{ G. F. }	10.4	9.5 9.8	3.5 4.1	9.0 4.0	3.50	Middlings, oats, oat hulls, corn feed meal.
B 5487	Henkels Chop Feed.....	{ G. F. }	9.8	12.4 5.2	6.4 6.4	3.20		Same as B 5052.
B 5613	Henkels Chop Feed.....	{ G. F. }	9.8	11.3 4.4	4.4	11.8		Same as B 5052.
B 5433	Harris Milling Co., Mt. Pleasant, Mich. Feed Meal Chop.....	Average.	10.0	11.2 4.6	4.6	7.4		Oats, corn feed meal.
B 5469	Feed Meal Chop.....	{ G. F. }	8.9	9.0 11.9	5.0 5.7	8.0 5.0	64.00	Same as B 5433.
B 5554	H. M. Hebert & Son, Detroit, Mich. P & H Chop Feed.....	Average.	9.8	11.6 5.5	5.5	5.3	2.95	Oats, corn feed meal.
B 5691	P & H Chop Feed.....	{ G. F. }	13.9 11.1	10.6 9.2	4.0 2.4	6.1 3.2	3.00	Oat hulls, corn feed meal.
B 5775	King Milling Co., Lowell, Mich. King Corn and Oat Feed.....	Average.	12.5	9.2 10.6	2.7 5.9	3.4 5.9	3.60	Oat hulls, corn feed meal.

B 5174	Chas. A. Krause Milling Co., Milwaukee, Wis.	Colons	{ G.* F.*	10.0 12.8 4.0 9.3	4.0 12.8 4.0 9.3	10.0 9.3 3.0 3.35	Oats, corn (trace), barley (trace).
B 5250	Badger Monopoly Feed	Pyramuth		10.1	10.1	3.0	Oats, corn, barley.
B 5648	Badger Monopoly Feed	Jackson		10.1	11.3	3.35	Same as B 5250.
	Lichtenberg & Son, Detroit, Mich.	Average		10.2	12.3	9.2	
B 5802	Lichtenberg's Chop Feed	Detroit	{ G.* F.*	7.7 10.3	8.4 10.4	9.4 8.8	54.00
B 5129	Peoples Milling Co., Muskegon, Mich.	Muskegon	{ G.* F.*	9.0 11.2	9.7 10.3	7.0 5.1	
	Corn Feed Meal and Ground Oats	Detroit	{ G.* F.*	9.0 11.8	9.7 9.8	7.0 4.5	Oats, oat hulls, corn, corn feed meal, screenings including weed seeds.
B 5691	Scheuren & Mok, Detroit, Mich.	Detroit	{ G.* F.*	9.0 11.8	9.7 9.8	7.0 4.5	Oats, oat hulls, corn meal, corn bran, screenings.
B 5283	Star of the West Milling Co., Frankenmuth, Mich.	Frankenmuth	{ G.* F.*	8.6 11.1	8.6 11.1	8.9 8.0	Oats, corn, corn bran, screenings.
B 5818	David Scott Milling Co., Detroit, Mich.	Detroit	{ G.* F.*	8.6 11.4	9.8 9.8	10.0 5.5	Oats, oat hulls, corn meal, screenings, salt.
	Stotta Winter Chop						
	OAT MEAL MILL BY-PRODUCT FEEDS.						
B 4688	Chas. F. Bartlett Co., Grand Rapids, Mich.	Grand Rapids	{ G.* F.*	5.7 8.7	8.1 6.6	27.5 25.7	Oat hulls, oat shorts.
B 5569	Oat Feed	St. Johns		6.1	8.1	2.2	Same as B 4688.
	E. P. Mueller, Chicago, Ill.	Average		7.4	7.4	26.7	
B 4677	Reground Oat Feed	Jamestown	{ G.* F.*	5.0 8.2	8.0 6.6	28.0 26.1	Oat hulls, oat shorts.
B 5308	Armour Grain Co., Chicago, Ill.	Jackson	{ G.* F.*	5.0 6.7	8.0 4.8	30.0 1.8	Oat hulls.
B 5326	Oat Hulls	Alpena		5.7	5.3	29.1	Same as B 5308.
B 5455	Oat Hulls	Holland		6.7	5.3	28.9	Same as B 5308.
B 5493	Oat Hulls	Plainfield		12.4	4.9	29.4	Same as B 5308.
		Average		7.9	5.0	29.2	

*Abbreviations for Guaranteed and Found.

B 5041	Flaked Corn Feed	Stockbridge	{ G. F. }	7.8	8.0	1.0	5.0	By-product from manufacture of corn flakes from corn grits.
B 5723	Flaked Corn Feed	Battle Creek	{ G. F. }	4.7	8.4	1.2	0.9	Same as B 5041.
		Average		6.3	9.0	2.2	1.2	
B 5718	GN Feed	Battle Creek	{ G. F. }	2.0	9.0	0.5	2.5	By-product from manufacture of breakfast food from wheat, barley and malt.
B 5309	GN Feed	Jackson	{ G. F. }	6.9	11.9	1.1	1.4	Same as B 5718.
		Average		4.5	12.1	1.3	1.3	

*Abbreviations for Guaranteed and Found.

MICHIGAN AGRICULTURAL COLLEGE

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	WHEAT BRAN.						
	Baldwin Flour Mills, Minneapolis, Minn.						
B 5379	Wheat Bran with ground screenings not exceeding mill run	Crystal Falls..... { G.*	10.5	14.5	4.0	12.0	
B 5387	Wheat Bran with ground screenings not exceeding mill run	Iron River..... { F.*	10.9	14.3	4.6	11.1	47.00
	Barnet, Craft & Kauffman Milling Co., Mt. Carmel, Ill.	Average.....	10.7	14.1	4.9	12.2	
B 5861	Mt. Carmel bran with screenings not exceeding mill run	Jackson..... { G.*	10.5	14.5	4.0	9.5	
	Big Diamond Mills Co., Minneapolis, Minn.	Jackson..... { F.*	10.5	16.1	4.2	9.1	2.70
B 5329	Big Diamond Wheat Bran with ground screenings not exceeding mill run	Alpena..... { G.*	9.1	12.0	4.0	12.0	
B 5466	Big Diamond Wheat Bran with ground screenings not exceeding mill run	Ithaca..... { F.*	10.4	15.0	4.6	12.0	49.00
	Blake Milling Co., Edwardsville, Ill.	Average.....	9.8	14.4	5.1	11.9	
B 5851	Extra Coarse Wheat Bran with ground screenings not exceeding mill run	Trenton..... { G.*	10.0	15.5	4.0	11.0	
	Buhler Mill & Elevator Co., Buhler, Kansas.	Trenton..... { F.*	10.0	17.6	4.0	9.5	2.70
B 5109	Wheat Bran and screenings	Muskegon..... { G.*	11.0	14.5	3.5	11.0	
	J. P. Burroughs & Sons, Flint, Mich.	Muskegon..... { F.*	11.0	15.2	3.9	9.7	45.00
B 5261	Winter Wheat Bran with ground screenings not exceeding mill run	Flushing..... { G.*	10.1	12.5	3.0	10.5	
B 5571	Winter Wheat Bran with ground screenings not exceeding mill run	Flint..... { F.*	10.5	14.6	3.8	9.9	
	Cannon Valley Milling Co., Minneapolis, Minn.	Average.....	10.3	14.4	3.1	9.6	
B 5281	C. V. Wheat Bran with ground screenings not exceeding mill run	Chesaning..... { G.*	10.1	15.0	4.0	14.6	
	Claro Milling Co., Waseca, Minn.	Chesaning..... { F.*	10.1	15.2	4.4	10.6	2.50
B 5360	Claro Wheat Bran with ground screenings not exceeding mill run	Stephenson..... { G.*	10.9	14.0	3.0	12.0	
	Consolidated Flour Mills Co., Hutchinson, Kansas.	Stephenson..... { F.*	10.9	15.0	4.8	10.4	
B 949	Wheat Bran with screenings	Northville..... { G.*	10.9	14.5	3.5	10.0	
B 5259	Wheat Bran with screenings	Owosso..... { F.*	11.3	16.5	4.0	9.1	
	Wm. A. Coombs Milling Co., Coldwater, Mich.	Average.....	11.2	15.6	4.4	10.5	
B 5022	Wheat Bran with ground screenings not exceeding mill run	Coldwater..... { G.*	10.6	14.0	3.0	9.0	
	Crookston Milling Co., Crookston, Minn.	Coldwater..... { F.*	10.6	13.9	4.0	9.5	46.00
B 5398	Bran with mill run screenings	Hancock..... { G.*	11.0	14.0	5.3	12.0	
		Hancock..... { F.*	11.0	16.4	5.6	9.8	48.50

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Eagle Roller Mills Co., New Ulm, Minn.						
B 5256	Wheat Bran with ground screenings not exceeding mill run.	Owosso..... { G.* F.*	10.3	14.0 13.6	3.4 5.4	12.0 10.7	48.00
B 5341	Wheat Bran with ground screenings not exceeding mill run.	Manistique.....	9.6	15.0	4.5	10.4	56.00
B 5368	Wheat Bran with ground screenings not exceeding mill run.	Iron Mountain.....	10.5	15.1	4.7	15.5	2.35
		Average.....	10.1	14.6	4.9	12.2	
	Ebeling Milling Co., Green Bay, Wis.						
B 5358	Ebeling's Green Bay Coarse Bran with ground screenings not exceeding mill run.	Escanaba..... { G.* F.*	11.1	15.0 15.8	4.0 4.7	11.0 10.5	2.60
	Everett Augenbaugh & Co., Waseca, Minn.						
B 4651	Eaco Wheat Bran with ground screenings not exceeding mill run.	Coopersville..... { G.* F.*	11.6	14.0 15.0	3.0 4.7	12.0 10.8	49.00
	Farmers Elevator & Produce Co., Bad Axe, Michigan.						
B 5670	Wheat Bran and screenings	Bad Axe..... { G.* F.*	10.3	14.5 15.7	3.5 3.9	10.0 10.0	
	Hales & Hunter Co., (formerly Hales & Edwards Co.) Chicago, Ill.						
B 4663	Wheat Bran with screenings not exceeding mill run.	Grand Rapids... { G.* F.*	11.4	14.0 14.8	3.0 4.1	11.0 10.4	43.00
	Hankey Milling Co., Petoskey, Mich.						
B 5198	Bran with mill run screenings	Petoskey..... { G.* F.*	11.0	15.5 15.3	3.7 4.0	9.5 10.5	44.00
	Hannah & Lay, Traverse City, Mich.						
B 5422	Wheat Bran with ground screenings not exceeding mill run.	Traverse City... { G.* F.*	9.8	15.0 14.9	5.0 4.2	11.6 11.4	48.00
	Harris Milling Co., Mt. Pleasant, Mich.						
B 5467	Bran with ground screenings not exceeding mill run	Mt. Pleasant... { G.* F.*	9.5	15.0 15.4	3.0 3.9	13.0 9.9	2.40
	W. J. Jennison Co., Minneapolis, Minn.						
B 5307	Wheat Bran with ground screenings not exceeding mill run.	Jackson..... { G.* F.*	9.8	12.0 15.0	4.0 4.7	12.0 10.6	2.40
	Kaw Milling Co., Topeka, Kansas.						
B 1350	Kaw Kaw Wheat Bran and scourings	Kent City..... { G.* F.*	10.3	15.0 18.0	3.5 4.2	10.0 8.3	2.65
B 5794	Kaw Kaw Wheat Bran and scourings	Grand Rapids... { G.* F.*	9.9	18.3	3.6	9.1	2.65
		Average.....	10.1	18.2	3.9	8.7	
	J. B. A. Kerns & Son, Milwaukee, Wis.						
B 5405	Kern's Wheat Bran & ground screenings not exceeding mill run	Novi..... { G.* F.*	10.3	13.0 14.5	4.0 4.8	13.0 10.4	47.00
	Larabee Four Mills Corporation, Kansas City, Mo.						
B 1341	Wheat Bran with mill run screenings not to exceed 8%.	Sparta..... { G.* F.*	10.3	15.0 16.7	3.5 4.5	10.5 9.1	50.00
B 5169	Wheat Bran with mill run screenings not to exceed 8%.	St. Joseph.....	10.7	16.0	4.4	9.4	47.00
B 5278	Wheat Bran with mill run screenings not to exceed 8%.	Howell.....	10.8	15.2	4.2	9.9	2.50
B 5454	Wheat Bran with mill run screenings not to exceed 8%.	Holland.....	9.6	17.1	4.0	10.5	2.66
		Average.....	10.4	16.3	4.3	9.7	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Marshall Milling Co., Marshall, Minn.							
B 5001	Wheat Bran with ground screenings not exceeding mill run	Springport.....	{ G.* F.*	14.5 12.9	4.0 4.7	12.5 11.5	22.75
National Feed Co., St. Louis, Mo.							
B 4787	Wheat Bran with ground screenings not exceeding mill run	Adrian.....	{ G.* F.*	14.5 16.3	4.0 3.9	10.0 10.1	2.50
B 5222	Wheat Bran with ground screenings not exceeding mill run	Adrian.....		10.0	15.4	4.0	10.4
		Average.....		9.9	15.9	4.0	10.3
New Era Milling Co., Arkansas City, Kan.							
B 5782	Polar Bear Bran and screenings	Sturgis.....	{ G.* F.*	14.5 16.8	3.5 4.0	10.0 9.5	2.50
Northern Milling Co., Wausau, Wisconsin.							
B 5357	Wheat Bran with ground screenings not exceeding mill run	Wecanaba.....	{ G.* F.*	14.0 14.2	4.0 5.0	13.0 11.8	2.60
Pillsbury Milling Co., Minneapolis, Minn.							
B 5423	Wheat Bran with ground screenings not exceeding mill run	Traverse City....	{ G.* F.*	13.0 15.0	4.0 4.8	13.0 11.7	47.00
M. G. Rankin & Co., Milwaukee, Wis.							
B 1363	Wheat Bran with ground screenings not exceeding mill run	Zeeland.....	{ G.* F.*	14.5 17.0	4.0 4.2	9.5 9.9	56.00
Red Star Milling Co., Wichita, Kansas.							
B 5229	Wheat Bran and screenings not exceeding 5%	Morenci.....	{ G.* F.*	15.0 15.7	3.7 4.4	10.0 11.4	2.50
Sheffield King Milling Co., Minneapolis, Minn.							
B 5119	Fancy Brodflake Wheat Bran and ground screenings	Muskegon.....	{ G.* F.*	13.5 15.4	4.0 4.4	12.7 9.5	42.00
Sleepy Eye Mills, Sleepy Eye, Minn.							
B 5671	Wheat Bran and screenings not exceeding mill run	Bad Axe.....	{ G.* F.*	13.5 16.5	3.2 4.5	13.4 11.7	
B 5746	Wheat Bran and screenings not exceeding mill run	Greenville.....		8.5	16.9	4.2	10.5
		Average.....		9.4	16.7	4.4	11.1
Sparks Milling Co., Alton, Ill.							
B 5267	Try-Me Bran with ground wheat screenings not exceeding mill run	Holly.....	{ G.* F.*	15.0 16.0	3.5 4.1	10.0 10.2	2.50
Stanard Tilton Milling Co., St. Louis, Mo.							
B 1323	Liberty Bond Wheat Bran with ground screenings not exceeding mill run	Hastings.....	{ G.* F.*	14.5 18.3	4.0 4.6	9.5 8.7	2.70
Star & Crescent Milling Co., Chicago, Ill.							
B 5445	Star Wheat Bran with ground screenings not exceeding mill run	Holland.....	{ G.* F.*	16.0 16.1	4.0 4.0	10.0 10.3	2.55
David Stott Milling Co., Detroit, Mich.							
B 5846	Spring Wheat Bran and wheat screenings not exceeding mill run	Detroit.....	{ G.* F.*	14.5 15.6	4.0 4.0	12.5 10.2	49.00
F. W. Stock & Sons, Hillsdale, Mich.							
B 5058	Bran with mill run screenings	Brooklyn.....	{ G.* F.*	15.0 14.8	3.0 3.8	10.0 8.8	2.50
B 5865	Bran with mill run screenings	Hillsdale.....		10.2	15.4	4.0	10.1
		Average.....		10.2	15.1	3.9	9.5

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Stokes Milling Co., Watertown, So. Dakota.						
B 5339	Wheat Bran with ground screenings not exceeding mill run	Cheboygan { G.*	14.5	3.8	13.0		
B 5363	Wheat Bran with ground screenings not exceeding mill run	Menominee { F.*	10.0	14.6	4.6	10.8	\$2.30
B 5461	Wheat Bran with ground screenings not exceeding mill run	Big Rapids	11.9	15.1	5.4	11.2	2.65
		Average	10.0	16.0	4.7	11.1	
	Updike Milling Co., Omaha, Neb.						
B 5299	Wheat Bran with mill run screenings	Highland { G.*	13.0	3.0	13.0		
		Highland { F.*	10.5	16.5	3.9	8.9	2.80
	Valley City Milling Co., Grand Rapids, Mich.						
B 5031	Rowena Wheat Bran with ground screenings not exceeding mill run	Leslie { G.*	13.0	3.5	10.0		
		Leslie { F.*	11.0	15.7	4.1	9.5	55.00
	Voight Milling Co., Grand Rapids, Mich.						
B 1348	Crescent Bran and mill run screenings	Casnovia { G.*	14.5	3.5	11.0		
B 1321	Voight's Winter Wheat Bran ground screenings not exceeding mill run	Grand Rapids { F.*	10.8	16.9	4.5	8.7	2.60
		Grand Rapids { G.*	14.5	4.0	10.0		
		Grand Rapids { F.*	10.6	17.4	4.3	8.2	49.00
	Wagner-White Co., Inc., Jackson, Mich.						
B 4786	Wheat Bran and screenings	Marshall { G.*	14.0	4.0	11.0		
B 5091	Wheat Bran and screenings	Jackson { F.*	10.2	14.8	3.6	9.6	50.00
B 5231	Wheat Bran and screenings	Morenci	11.0	17.8	4.7	10.8	2.30
B 5300	Wheat Bran and screenings	Sandusky	10.8	16.0	4.9	11.1	2.50
		Average	10.0	16.5	4.4	11.6	2.80
	Washburn Crosby Co., Minneapolis, Minn.						
B 5150	Wheat Bran with ground screenings not exceeding mill run	Holland { G.*	13.0	4.0	13.0		
B 5515	Wheat Bran with ground screenings not exceeding mill run	Minneapolis { F.*	10.9	15.6	4.7	10.7	45.00
		Average	10.8	15.6	4.6	10.3	2.30
	Weber Flour Mill Corporation, Salina, Kansas.						
B 5294	Wheat Bran and wheat screenings not exceeding 8%	Cass City { G.*	14.5	3.5	11.0		
B 5884	Wheat Bran and wheat screenings not exceeding 8%	Birmingham { F.*	10.6	15.4	3.8	9.1	2.60
		Average	9.6	17.6	4.2	9.1	2.00
	Western Flour Mills, Davenport, Iowa.						
B 5748	Blackhawk Bran with mill run screenings	Pelding { G.*	13.3	3.0	13.0		
		Pelding { F.*	8.7	16.6	4.7	10.2	
	WHEAT MIDDINGS.						
	Bay State Milling Co., Winona, Minn.						
B 5504	Bay State Wheat Middlings with ground screenings not exceeding mill run	Ishpeming { G.*	15.0	4.0	7.5		
		Ishpeming { F.*	11.0	16.4	4.6	7.2	50.00
	Bernhard Stern & Sons, Inc., Milwaukee, Wis.						
B 5531	Standard Wheat Middlings with ground screenings not exceeding mill run	Parma { G.*	14.0	3.5	11.5		
		Parma { F.*	10.2	14.5	4.6	9.6	60.00
	Baldwin Flour Mills, Minneapolis, Minn.						
B 5378	Wheat Shorts with not exceeding mill run screenings	Escanaba { G.*	15.0	5.0	11.0		
B 5384	Wheat Shorts with not exceeding mill run screenings	Iron River { F.*	11.0	15.2	5.3	9.4	3.50
		Average	11.4	15.1	4.9	8.4	49.00
		Average	11.2	15.2	5.1	8.9	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory numbers	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Big Diamond Milling Co., Minneapolis, Minn.						
B 5327	Big Diamond Standard Middlings with ground screenings not exceeding mill run.	Alpena..... { G.* F.*	10.3	15.0 16.4	5.0 4.8	10.0 8.7	33.45
B 5465	Big Diamond Standard Middlings with ground screenings not exceeding mill run.	Ithaca.....	12.6	15.8	4.6	8.1	2.00
		Average.....	11.5	16.1	4.7	8.4	
	Century Milling Co., Minneapolis, Minn.						
B 5400	Berkshire Flour Middlings with ground screenings not exceeding mill run.	Hancock..... { G.* F.*	10.2	15.0 16.8	4.0 4.8	8.0 8.0	57.00
	C. S. Christensen Co., Madelia, Minn.						
B 5833	Wheat Standard Middlings with ground screenings not exceeding mill run.	Detroit..... { G.* F.*	10.7	14.7 15.8	4.0 4.1	8.8 8.1	54.00
	Commercial Milling Co., Detroit, Mich.						
B 5816	Standard Wheat Middlings with ground screenings not exceeding mill run.	Detroit..... { G.* F.*	12.0	13.5 16.3	4.5 4.4	10.0 7.2	
B 5473	Standard Wheat Middlings with ground screenings not exceeding mill run.	Kalamasoo.....	12.4	16.8	4.8	8.2	60.00
		Average.....	12.2	16.6	4.6	7.7	
	Wm. A. Coombs Milling Co., Kalamasoo, Mich.						
B 5023	Rob Roy Wheat Middlings with ground screenings not exceeding mill run.	Coldwater..... { G.* F.*	10.6	15.0 14.9	3.0 4.3	6.0 7.8	52.00
B 5067	Rob Roy Wheat Middlings with ground screenings not exceeding mill run.	Montgomery.....	10.6	16.3	5.0	6.5	2.95
B 5486	Rob Roy Wheat Middlings with ground screenings not exceeding mill run.	Kalamasoo.....	11.8	16.6	5.0	6.6	
		Average.....	11.0	15.9	4.8	7.0	
	Crookston Milling Co., Crookston, Minn.						
B 5399	Fine Middlings with ground screenings not exceeding mill run.	Hancock..... { G.* F.*	11.3	15.0 16.4	5.3 5.2	7.0 8.7	53.00
B 5397	Flour Middlings with ground screenings not exceeding mill run.	Hancock..... { G.* F.*	11.1	14.0 15.6	3.3 3.4	3.6 3.2	66.00
	Eagle Roller Mills Co., New Ulm, Minn.						
B 5340	Wheat Middlings with ground screenings not exceeding mill run.	Manistique..... { G.* F.*	10.8	14.0 15.6	4.0 4.4	11.0 9.0	3.00
B 5369	Wheat Middlings with ground screenings not exceeding mill run.	Iron Mountain.....	10.7	15.7	4.6	9.3	2.73
		Average.....	10.8	15.7	4.5	9.2	
	Empire Milling Co., Minneapolis, Minn.						
B 5376	Wheat Standard Middlings with ground screenings not exceeding mill run.	Iron Mountain..... { G.* F.*	11.2	15.0 16.5	5.0 5.1	10.0 8.0	
	Everett Augenbaugh Co., Waseca, Minn.						
B 4652	Eaco Wheat Middlings with ground screenings not exceeding mill run.	Coopersville..... { G.* F.*	11.8	15.0 17.4	3.0 5.0	10.0 7.4	64.00
B 5674	Eaco Wheat Middlings with ground screenings not exceeding mill run.	Port Huron.....	10.7	18.7	5.1	7.7	3.00
		Average.....	11.3	18.1	5.1	7.6	
	Gosch Milling & Elevator Co., Lincoln, Neb.						
B 5330	Wheat Shorts with ground screenings.	Parma..... { G.* F.*	9.7	16.0 17.6	3.5 5.5	5.3 6.4	65.00
	Hannah & Lay, Traverse City, Mich.						
B 5426	Wheat Middlings with ground screenings not exceeding mill run.	Traverse City..... { G.* F.*	10.8	16.7 15.7	5.4 4.7	7.3 7.4	56.00

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Hermels Milling Co., Austin, Minn.							
B 967	Red Seal Standard Middlings with ground screenings not exceeding mill run.	Bad Axe	{ G.* 16.0 F.* 11.2	5.0 16.6	10.0 4.3	7.8	\$3.75
Hubbard Milling Co., Mankato, Minn.							
B 5393	Standard Wheat Fine Middlings with ground screenings not exceeding mill run.	Ontonagon	{ G.* 15.0 F.* 12.4	4.9 16.3	15.0 5.6	10.2	3.00
Hunter-Robinson Milling & Grain Co., St. Louis, Mo.							
B 5832	Wheat Middlings with ground screenings not exceeding mill run.	Detroit	{ G.* 15.5 F.* 9.9	4.0 19.8	8.0 4.9	5.2	64.00
Ismert-Hincke Milling Co., Topeka, Kansas.							
B 956	A. B. C. Middlings with mill run screenings not exceeding 8%.	Ann Arbor	{ G.* 16.0 F.* 10.6	3.5 17.7	6.5 4.6	6.8	3.25
B 965	A. B. C. Middlings with mill run screenings not exceeding 8%.	Clayton	10.4	18.2	4.5	7.1	50.00
B 1368	A. B. C. Middlings with mill run screenings not exceeding 8%.	Holland	10.9	17.6	4.8	6.9	
B 1374	A. B. C. Middlings with mill run screenings not exceeding 8%.	Holland	10.4	17.6	4.1	6.5	
B 5653	A. B. C. Middlings with mill run screenings not exceeding 8%.	Blissfield	11.2	16.5	4.7	7.1	3.10
Kansas Flour Mills Co., Kansas City, Mo.							
B 5230	Wheat Middlings and Wheat screenings	Morenci	{ G.* 16.0 F.* 11.7	3.5 16.3	6.5 4.2	6.3	3.35
Kaw Milling Co., Topeka, Kansas.							
B 1349	Kaw Kaw Standard Shorts and ground screenings.	Kent City	{ G.* 16.0 F.* 12.0	3.5 18.2	6.5 4.1	4.3	3.15
Mayflower Mills, Fort Wayne, Indiana.							
B 5065	Mayflower Middlings with ground screenings not exceeding mill run.	Camden	{ G.* 14.0 F.* 10.7	4.0 16.4	9.5 5.2	8.2	3.00
Midland Flour Milling Co., Kansas City, Mo.							
B 960	Flour Middlings and screenings not exceeding mill run.	Howell City	{ G.* 16.0 F.* 10.9	3.5 17.3	6.5 4.3	6.2	
National Feed Co., St. Louis, Mo.							
B 5732	Wheat Middlings* with ground screenings not exceeding mill run.	Battle Creek	{ G.* 16.0 F.* 11.1	4.0 17.8	10.0 5.3	7.4	3.00
B 5737	Wheat Middlings with ground screenings not exceeding mill run.	Battle Creek	10.5	17.8	4.6	7.4	3.00
New Richmond Roller Mills, New Richmond, Wis.							
B 5347	Fine White Country Middlings with ground screenings not exceeding mill run.	Gladstone	{ G.* 13.0 F.* 10.1	3.5 15.6	9.0 4.7	8.3	3.00
B 5383	Fine White Country Middlings with ground screenings not exceeding mill run.	Iron River	11.3	15.3	4.2	7.1	49.00
North Western Consolidated Milling Co., Minneapolis, Minn.							
B 5375	Wheat Standard Middlings with ground screenings not exceeding mill run.	Iron Mountain	{ G.* 15.0 F.* 10.4	4.5 16.3	11.0 5.1	8.5	2.75

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1910-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Northwestern Elevator & Mill Co., Toledo, Ohio.							
B 5228	Wheat Middlings with ground screenings not exceeding mill run.	Morenci..... { G.* F.*	14.0 10.3	3.0 16.3	9.0 4.6	9.0 6.3	\$3 35
B 5592	Wheat Middlings with ground screenings not exceeding mill run.	Saginaw.....	11.0	17.0	4.5	5.5	60 00
		Average.....	10.7	16.7	4.6	5.9	
Pillsbury Flour Mills Co., Minneapolis, Minn.							
B 5284	Wheat A Middlings with ground screenings.	Vassar..... { G.* F.*	15.0 10.7	4.0 16.5	8.0 4.3	8.0 5.9	3 40
B 5395	Wheat A Middlings with ground screenings.	Ontonagon.....	11.0	16.4	4.6	6.7	3 75
		Average.....	10.9	16.5	4.5	6.3	
B 4797	Wheat Standard "B" Middlings with screenings not exceeding mill run.	Springport..... { G.* F.*	14.0 11.2	4.0 16.1	11.0 4.9	11.0 9.2	3 35
B 5396	Wheat Standard "B" Middlings with screenings not exceeding mill run.	Ontonagon.....	10.7	16.0	5.1	11.2	3 50
		Average.....	11.0	16.1	5.0	10.2	
Shane Bros. & Wilson Co., Minneapolis, Minn.							
B 1330	Snowball Wheat Flour Middlings with ground screenings not exceeding mill run.	Comstock Park.. { G.* F.*	16.0 11.3	4.0 17.5	9.0 4.7	9.0 6.7	3 65
Sheffield King Milling Co., Minneapolis, Minn.							
B 5118	Fairy Bow Standard Middlings with pulverized wheat screenings.	Muskegon..... { G.* F.*	15.0 13.1	5.0 16.9	9.5 5.1	9.5 7.1	49 00
B 5675	Fairy Bow Standard Middlings with pulverized wheat screenings.	Port Huron.....	10.6	17.8	4.6	8.9	3 00
		Average.....	11.9	17.4	4.9	8.0	
Southwestern Milling Co., Kansas City, Mo.							
B 5068	Red Turkey Wheat Brown Shorts and wheat scourings.	Montgomery..... { G.* F.*	15.0 10.9	4.2 18.2	8.5 4.2	8.5 8.9	3 20
B 5084	Red Turkey Wheat Brown Shorts and wheat scourings.	Clinton.....	10.6	17.0	4.0	9.1	56 00
B 5489	Red Turkey Wheat Brown Shorts and wheat scourings.	Kalamasoo.....	10.8	18.5	5.0	8.4	2 70
		Average.....	10.8	17.9	4.4	8.8	
The St. Paul Milling Co., St. Paul, Minn.							
B 5264	Komo Standard Middlings with ground screenings not exceeding mill run.	Holly..... { G.* F.*	15.0 10.9	4.5 16.1	10.5 5.4	10.5 9.2	3 00
Star & Crescent Milling Co., Chicago, Ill.							
B 5439	Star Standard Middlings with ground screenings not exceeding mill run.	Holland..... { G.* F.*	15.0 10.5	4.0 17.8	8.0 5.1	8.0 7.5	3 05
Stanard Tilton Milling Co., St. Louis, Mo.							
B 957	Liberty Bond Wheat Middlings with screenings not exceeding mill run.	Ann Arbor..... { G.* F.*	15.0 10.2	4.0 17.8	6.0 4.9	6.0 5.3	61 00
David Stott Milling Co., Detroit, Mich.							
B 5844	Pennant Middlings with ground screenings not exceeding mill run.	Detroit..... { G.* F.*	15.0 10.5	4.0 17.9	9.0 4.1	9.0 7.5	55 00
B 5859	Pennant Middlings with ground screenings not exceeding mill run.	Detroit.....	10.9	16.3	4.6	6.6	2 75
		Average.....	10.7	17.0	4.4	7.1	

*Abbreviations for Guaranteed and Found.

COMMERCIAL FEEDING STUFFS

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ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
	Valley City Milling Co., Grand Rapids, Mich.						
B 4664	Rowena Wheat Middlings with ground screenings not exceeding mill run.....	Grand Rapids... { G.* F.*	11.9	15.5 16.3	4.3 5.0	9.0 6.8	\$56.00
B 5032	Rowena Wheat Middlings with ground screenings not exceeding mill run.....	Leslie.....	10.7	17.4	5.2	6.9	3.25
		Average.....	11.3	16.9	5.1	6.9	
	Voight Milling Co., Grand Rapids, Mich.						
B 1320	Crescent Middlings with ground screenings not exceeding mill run.....	Grand Rapids... { G.* F.*	11.1	14.5 16.9	4.0 4.5	10.0 6.5	52.00
B 4686	Crescent Middlings with ground screenings not exceeding mill run.....	Grand Rapids.....	11.2	16.9	4.7	6.3	55.00
		Average.....	11.2	16.9	4.6	6.4	
B 1347	Voights Winter Wheat Middlings mill run screenings.....	Casnovia... { G.* F.*	12.1	15.0 17.6	4.0 4.7	8.0 6.5	3.15
	Wagner White Co., Inc., Jackson, Mich.						
B 959	Fancy Wheat Middlings with ground screenings not exceeding mill run.....	Howell... { G.* F.*	11.1	16.0 17.1	3.5 4.1	8.0 5.1	60.00
B 5785	Fancy Wheat Middlings with ground screenings not exceeding mill run.....	Constantine.....	11.0	18.3	4.8	5.7	58.00
		Average.....	11.1	17.7	4.5	5.4	
	Washburn Crosby Co., Minneapolis, Minn.						
B 5002	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Albion... { G.* F.*	10.7	14.0 16.5	4.0 4.7	11.0 9.3	48.00
B 5149	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Holland.....	12.0	16.3	4.7	10.7	45.00
B 5349	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Gladstone.....	10.9	16.7	4.7	8.8	3.00
B 5424	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Traverse City.....	10.1	16.8	5.0	8.6	54.00
B 5516	Wheat Standard Middlings with ground screenings not exceeding mill run.....	Marquette.....	10.8	16.3	5.1	8.1	2.50
		Average.....	10.9	16.5	4.8	9.1	
	Watson Higgins Milling Co., Grand Rapids, Mich.						
B 1344	Perfection Wheat Middlings with mill run screenings.....	Sparta... { G.* F.*	11.3	14.0 16.8	3.0 4.6	10.0 5.5	64.00
B 5146	Perfection Wheat Middlings with mill run screenings.....	Grand Rapids.....	11.3	16.9	4.5	5.1	58.00
B 5162	Perfection Wheat Middlings with mill run screenings.....	Benton Harbor.....	11.5	17.2	4.6	4.4	70.00
		Average.....	11.4	17.0	4.6	5.0	
	Western Flour Mills Co., Davenport, Iowa.						
B 5629	Black Hawk Wheat Standard Middlings with ground screenings not exceeding mill run.....	Lapeer... { G.* F.*	12.8	15.0 17.6	4.5 4.7	7.7 5.1	
	WHEAT MIXED FEEDS.						
	Baldwin Milling Co., Minneapolis, Minn.						
B 5501	Hub Mixed Feed with ground screenings not exceeding mill run.....	Houghton... { G.* F.*	10.1	15.0 14.8	4.5 5.1	10.0 9.9	
	J. E. Bartlett Co., Jackson, Mich.						
B 5238	Fine Ground Mixed Feed.....	Wayne... { G.* F.*	10.6	16.6 16.3	4.3 4.5	12.8 6.3	3.60
B 5306	Fine Ground Mixed Feed.....	Jackson.....	10.3	15.1	4.8	8.2	2.50
B 5311	Fine Ground Mixed Feed.....	Jackson.....	10.3	14.7	4.9	7.7	
B 5789	Fine Ground Mixed Feed.....	Cassopolis.....	11.2	16.1	4.6	5.3	65.00
		Average.....	10.6	15.6	4.7	6.9	

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude Protein.	Crude fat.	Crude fiber.	Price per ton or cwt.
Huron Milling Co., Harbor Beach, Mich.							
B 5297	Jenks Wheat Mixed Feed with ground screenings not exceeding mill run.	Bad Axe..... { G.*	14.0	3.5	11.5		
B 5299	Jenks Wheat Mixed Feed with ground screenings not exceeding mill run.	Bad Axe..... { F.*	9.3	14.3	3.9	8.3	\$52.00
B 5330	Jenks Wheat Mixed Feed with ground screenings not exceeding mill run.	Harbor Beach.....	10.5	14.5	4.1	8.1	
		Alpena.....	9.8	13.9	3.9	8.9	52.00
		Average.....	9.9	14.2	4.0	8.4	
Portland Milling Co., Portland, Mich.							
B 5039	Champion Mixed Feed with screenings not exceeding mill run.	Williamston..... { G.*	13.5	3.5	8.4		
		Williamston..... { F.*	10.2	15.7	4.1	8.5	2.90
F. W. Stock & Sons, Hillsdale, Mich.							
B 5059	Monarch Wheat Feed with mill run screenings.	Brooklyn..... { G.*	16.0	4.0	10.0		
B 5866	Monarch Wheat Feed with mill run screenings.	Hillsdale..... { F.*	10.4	15.3	4.9	8.3	2.90
		Hillsdale.....	10.2	16.1	4.3	8.7	2.65
		Average.....	10.3	15.7	4.6	8.5	
David Stott Milling Co., Detroit, Michigan.							
B 5847	Stotts Heavy Mixed Feed.	Detroit..... { G.*	14.0	3.5	8.8		
		Detroit..... { F.*	10.4	17.4	3.7	6.6	53.50
B 5843	Stotts Honest Mixed Feed.	Detroit..... { G.*	14.5	4.0	10.5		
		Detroit..... { F.*	10.3	16.5	3.7	7.0	53.50
Valley City Milling Co., Grand Rapids, Mich.							
B 1319	Rowena Wheat Cow Feed.	Grand Rapids... { G.*	15.0	4.0	8.6		
		Grand Rapids... { F.*	10.7	16.4	4.3	7.0	52.00
WHEAT AND RYE MIXED FEEDS.							
Commercial Milling Co., Detroit, Mich.							
B 5080	Henkel's Fine White Feed.	Onsted..... { G.*	15.0	4.0	9.0		
B 5226	Henkel's Fine White Feed.	Clayton..... { F.*	10.5	16.1	3.7	5.8	60.00
B 5815	Henkel's Fine White Feed.	Detroit.....	11.8	13.4	3.1	5.5	3.40
		Detroit.....	11.2	16.4	3.5	5.6	
		Average.....	11.2	15.3	3.4	5.6	
Cereal Mills Co., Wausau, Wis.							
B 5364	Wheat and Rye Middlings with ground screenings not exceeding mill run.	Menominee..... { G.*	17.0	5.0	5.0		
		Menominee..... { F.*	11.3	15.7	4.4	5.5	3.15
RYE FEED.							
Wm. A. Coombs Milling Co., Coldwater, Mich.							
B 5475	Rob Roy Rye Feed.	Coldwater..... { G.*	15.6	2.9	6.0		
		Coldwater..... { F.*	10.4	16.1	3.7	5.0	
Shane Bros. & Wilson Co., Minneapolis, Minn.							
B 5337	Rye Middlings with ground screenings not exceeding mill run.	Cheboygan..... { G.*	15.5	3.5	7.5		
		Cheboygan..... { F.*	9.9	17.4	3.7	5.2	2.00
Voigt Milling Co., Grand Rapids, Mich.							
B 1322	Voigt's Rye Feed.	Grand Rapids... { G.*	16.0	2.5	4.5		
		Grand Rapids... { F.*	10.7	14.3	2.7	4.6	52.00

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture.	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
MISCELLANEOUS FEEDS.								
B 5730	Armour Grain Co., Battle Creek, Mich. Corn Feed.....	Battle Creek..... { G.* F.*	3.5	7.0 9.9	0.5 3.1	1.5 1.2	\$2.75	
B 5751	Chas. F. Bartlett Co., Grand Rapids, Mich. Cotton Seed Hulls.....	Grand Rapids..... { G.* F.*	10.2	3.6	1.0	43.4		
B 5755	Cotton Seed Hulls.....	Paw Paw.....	8.9	3.8	0.9	42.5		
B 5772	Cotton Seed Hulls.....	Orleans.....	11.1	3.9	0.9	44.2		
B 5784	Cotton Seed Hulls.....	Constantine.....	9.2	4.4	0.9	44.9	30.00	
B 1386	Cotton Seed Hulls.....	Niles.....	9.3	4.4	0.9	43.5	1.75	
	Average.....		9.7	4.0	0.9	43.7		
B 5310	Chicago Grain & Salvage Co., Chicago, Ill. Cotton Seed Hull Bran.....	Jackson..... { G.* F.*	11.3	3.2	0.4	36.3		
B 5708	Bel-Car Mo Nut Butter Co., Grand Rapids, Mich. Bel-Car Mo Peanut Bran.....	Grand Rapids... { G.* F.*	4.7	19.4 20.4	25.2 29.0	7.8 9.4		Peanut hulls.
B 4658	Blatchford Calf Meal Co., Waukegan, Ill. Blatchford's Rabbit Meal.....	Grand Rapids... { G.* F.*	11.2	20.0 22.9	4.5 4.7	8.0 8.5	5.35	Cottonseed meal, linseed meal, locust bean meal, barley and malt sprout meal, flaxseed unpressed, rice polish, cocoshell meal, coconut meal, blood flour, wheat flour, wheat bran, ground beans and peas, fearegreek, anise, salt, dried milk.
B 5010	Blatchford's Rabbit Meal.....	Marshall.....	11.7	22.4	5.3	7.6	6.40	Same as B 4658.
B 5014	Blatchford's Rabbit Meal.....	Jackson.....	11.2	22.2	4.4	7.4	6.00	Same as B 4658.
B 5821	Blatchford's Rabbit Meal.....	Detroit.....	11.3	21.1	4.2	6.4	110.00	Same as B 4658.
	Average.....		11.4	21.9	4.6	7.1		
B 5707	Blue Bell Peanut Butter Co., Grand Rapids, Mich. Blue-Bell Peanut Bran.....	Grand Rapids... { G.* F.*	4.6	24.0 20.2	30.2 31.6	6.8 7.8	30.00	Peanut hulls.
B 5526	Brooks Elevator Co., Minneapolis, Minn. Climax Linseed.....	Jackson..... { G.* F.*	8.6	14.0 14.3	7.0 7.3	14.0 16.0		Ground flaxseed and grain screenings.

*Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1919-1920.—CONTINUED.

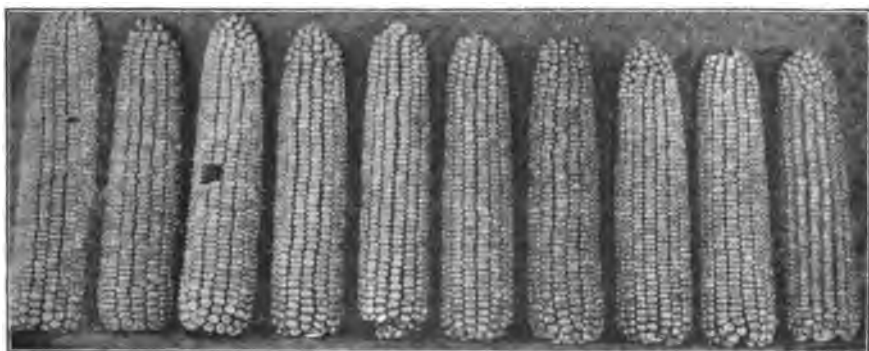
Laboratory number.	Manufacturer and Trade Name.	Sampled at	Moisture	Crude protein.	Crude fat.	Crude fiber.	Price per ton or cwt.	Principal ingredients identified.
B 5293	Capital Food Co., New York, N. Y. Empire Stock Conditioner	Selawang. { G.* F.*	7.2	7.9	4.5	24.6	\$15.00	Cocoashell, sassafras bark, peanut shell, buckwheat hulls, flour of sulfur, opson salts, oyster shells, gentian, copperas.
B 5771	Colby Milling Co., Dowagiac, Mich. Wheat Sourings	Dowagiac. { G.* F.*	7.9	13.8 14.8	3.6 4.1	12.8 14.8		
B 5196	Larowe Milling Co., Detroit, Mich. Dried Beet Pulp and Molasses	Grand Rapids. { G.* F.*	7.1	9.0	0.6	18.0		Dried beet pulp, molasses.
B 5870	Dried Beet Pulp and Molasses	Adrian. { G.* F.*	8.2	10.9 9.4	0.7 0.8	16.9 14.9	60.00	Same as B 5196.
B 970	Montgomery, Voorheis & Co., Chicago, Ill. Bee Feed Meal	Average. { G.* F.*	7.7	10.2	0.8	15.9		Ground corn, kafir and milo.
B 5113	E. P. Mueller, Chicago, Ill. Fine Ground Seed Screenings	Muskegon Hts. { G.* F.*	9.7	16.0	6.0	12.0	45.00	Ground screenings.
B 5186	Fine Ground Seed Screenings	Shelby. { G.* F.*	9.4	12.6 13.2	7.4 5.6	19.0 14.1	45.00	Ground screenings.
B 5193	Fine Ground Seed Screenings	Coopersville. { G.* F.*	9.9	14.0 13.7	6.4 6.6	14.7 16.8	48.00	Ground screenings.
B 5195	Fine Ground Seed Screenings	Grand Rapids. { G.* F.*	9.4	13.7	6.6	16.8	50.00	Ground screenings.
B 5437	Fine Ground Seed Screenings	Grand Haven. { G.* F.*	9.5	11.8	4.5	19.8		Ground screenings.
B 5156	Flaxseed Screenings	Average. { G.* F.*	9.6	13.1	6.1	16.9		Flax plant by-product.
B 5185	Pea and Barley Feed	Manistee. { G.* F.*	12.3	7.9	1.7	36.3	32.50	Peas, buckwheat hulls, barley, millet.
B 5719	Peetum Cereal Co., Battle Creek, Mich. Barley Bran	Manistee. { G.* F.*	9.4	10.9	3.1	28.2	46.00	Barley hulls, barley middlings, screenings.
B 5594	Saginaw Milling Co., Saginaw, Mich. Buckwheat Feed	Battle Creek. { G.* F.*	6.7	8.0 9.5	1.9 2.1	30.0 18.9	1.80	Buckwheat hulls, buckwheat middlings, screenings.
		Saginaw. { G.* F.*	12.6	12.5 14.8	5.9 8.3	17.8 17.9	40.00	

B 5525	F. J. Smith, Pickford, Mich. Pickford Mixed Grains.....	Sault Ste. Marie. { G.* F.*	10.6 11.8	2.4 2.5	3.7 3.8	\$4.15	Peas, oats, corn, buckwheat, barley, screenings, spelta.
B 5566	Arnold A. Thurnau Grain & Feed Co., St. Louis, Mo. Malt Sprouts.....	{ G.* F.*	26.7	1.0	14.4	60.00	Malt sprouts and kiln ashes.
B 5145	Watson Higgins Milling Co., Grand Rapids, Mich. Sweepings.....	{ G.* F.*	10.8 11.4	5.0	5.1		

*Abbreviations for Guaranteed and Found.

CORN GROWING IN MICHIGAN

J. F. COX AND J. R. DUNCAN



MICHIGAN AGRICULTURAL COLLEGE
EXPERIMENT STATION

FARM CROPS SECTION

EAST LANSING, MICHIGAN



1. An Old Indian Corn Clearing

The farthest north and one of the most ancient of Michigan's Indian corn clearings, located on the banks of the St. Mary's River in Chippewa County.

These clearings were visited annually by the Indians for the purpose of planting and harvesting a crop of corn and were very numerous, particularly in the Lower Peninsula in the days of the early settlement of the State.

The following, quoted from a recent letter from Mr. Otto Fowle of Sault Ste. Marie, gives some interesting information in regard to the early history of corn growing by the Indians:—

"The Indian name for the river and vicinity was Mash-ko-de-sa-ging, which signified openings of fields near the rapids.

These fields were undoubtedly formerly cultivated by the Indians, on which were raised corn and squashes, but at a time beyond the memory of present inhabitants, and I find no written account of this cultivation more than that Jacob M. Howard, Attorney for the claimants in the Repintigny case, visited this spot in 1862 and found a small encampment of Indians there.

The Jesuit Fathers who founded the Mission at the Sault in 1668, immediately began the cultivation of corn. Galinee, the Sulpitian priest who visited the Sault in 1680 writes, "They—the Jesuit Fathers—have a large clearing well planted from which they ought to gather a good part of their sustenance; they are hoping to eat bread within two years from now." This of course was corn bread, as wheat raising was not attempted.

In the trial of the Repintigny case, referred to, which was in relation to events which occurred at the time of the building of the French Fort at the Sault-1751 to 1755, the following testimony was adduced: "He-Repintigny-has engaged a Frenchman who married at the Sault Ste. Marie an Indian woman, to take a farm; they have cleared it up and sowed it and without a frost they will gather from 30 to 35 sacks of corn."

CORN GROWING IN MICHIGAN

Corn growing is one of Michigan's greatest industries. During the year, 1919, Michigan's corn crop was worth between \$80,000,000 and \$90,000,000, its value being greater than that of any other crop produced in Michigan. Michigan's corn growing counties are marked by thrifty herds of cattle and numerous flocks of hogs and sheep. The silo has extended her corn growing sections far to the north. The great stock-feeding and dairying interests, and the large food products industries of Michigan are largely supported by the corn crop. The production of corn compares favorably with Michigan's leading industries. The value of the corn crop approximately equals the total annual output of Michigan's copper mines, or iron mines, and exceeds the value of her furniture industry in normal years.

"The big business" of corn growing differs from other large industries such as automobile production, copper and iron mining, etc., in that its direction is not in the hands of a relatively few captains of industry, with specialists assigned to particular details of production, but it is owned and managed by several hundred thousand independent corn producers, each of whom must know the details of his business. The degree of success of the individual is largely in proportion to his knowledge of corn growing. Those who employ improved methods in selecting and storing seed corn, preparing the land, fertilizing and cultivating the crop, etc., are assured of a marked advantage over the corn grower who does not follow these methods. The prosperity of the State, and of individual farmers growing corn, is influenced in a large measure by the success of the corn crop, and it is to the interest of both the State and corn growers to secure the wide spread use of the methods which the most successful producers have found best.

For the past 15 years, Michigan's average production has been 53,000,000 bushels with an average yield per acre of 32.3 bushels. This average yield compares very favorably with the yield per acre of leading corn belt States, but double this yield or more can be expected on average corn land as a result of the employment of proper cultural methods. There is substantial reason to believe that greater care on the part of the majority of corn growers in choosing adapted varieties, selecting seed, preparing the land, and cultivating the crop, will bring about a very considerable increase in the total production and in the average yield per acre.

CORN GROWING IN MICHIGAN

MICHIGAN CORN YIELDS

YEAR.	Acres harvested.	Average yield per acre.	Total production (000 omitted).	Average price December 1.	Total value (000 omitted).	Average value per acre.
	Acres.	Bushels.	Bushels.	Dollars.	Dollars.	Dollars.
1905.....	1,229,000	34.0	41,776	0.46	19,317	15.84
1906.....	1,475,000	37.0	54,575	0.44	24,012	16.28
1907.....	1,900,000	30.1	57,190	0.55	31,454	16.56
1908.....	1,900,000	31.8	60,420	0.64	38,669	20.25
1909.....	1,560,000	33.3	52,007	0.61	32,273	20.31
1910.....	1,670,000	32.4	54,108	0.53	28,677	17.17
1911.....	1,690,000	33.0	55,770	0.65	36,250	21.45
1912.....	1,625,000	34.0	55,250	0.57	31,492	19.28
1913.....	1,675,000	33.5	56,112	0.67	37,595	22.44
1914.....	1,750,000	36.0	63,000	0.67	42,210	24.12
1915.....	1,750,000	32.0	56,000	0.68	38,080	21.76
1916.....	1,650,000	27.5	45,375	0.95	43,106	26.12
1917.....	1,750,000	21.5	37,625	1.82	68,478	39.12
1918.....	1,610,000	30.0	48,300	1.30	62,790	39.00
1919.....	1,650,000	39.0	64,350	1.38	88,803	53.22
Average.....	1,660,933	32.3	53,517	0.79	41,540	24.99

The foregoing table, compiled by Mr. V. H. Church, Federal Crops Statistician of Lansing, Michigan, gives acreage, yield and prices of the Michigan corn crop for the past 15 years.

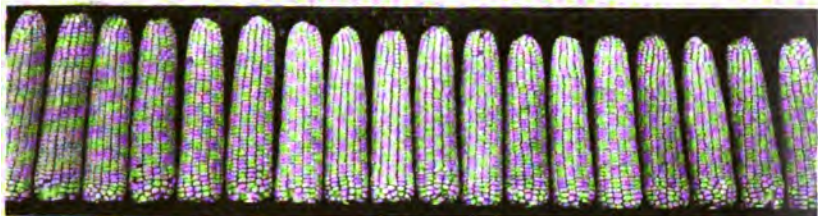
MICHIGAN CORN VARIETIES

The study of corn in Michigan corn fields, stored in Michigan corn cribs, or assembled for exhibit at local corn shows has established the fact that in many localities there are too great a number of varieties. It is not uncommon to find as many as thirty or forty different varieties exhibited at a single corn exhibit. These varieties vary markedly in appearance, ranging from carefully selected strains of proper adaptation and high yielding ability to varieties apparently too late or too early in maturity for the community and showing little improvement through breeding. The range in color includes the standard yellow, white and white cap varieties, and strains of red, red splashed and blue corn, and frequent mixtures.

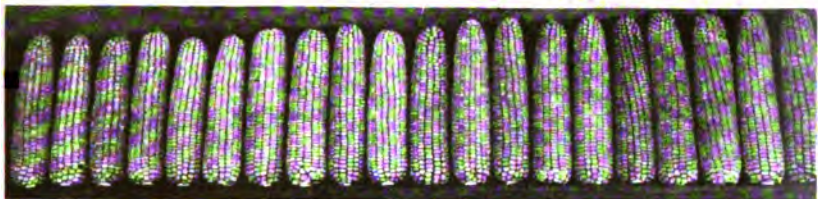
Careful variety tests have proven that these varieties vary as much in yielding ability as in appearance, certain ones being capable of yielding many bushels more under the same conditions than the majority of the varieties in the tests.

THE BEST VARIETIES SHOULD BE ACCEPTED AS STANDARDS

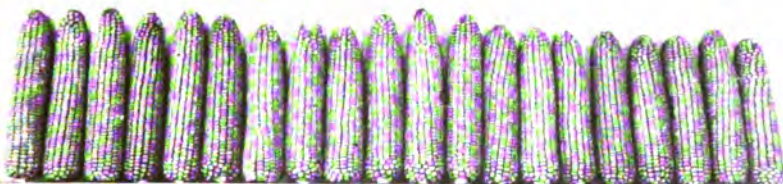
Fortunately there are men in practically all Michigan corn growing sections who have taken great interest in the development of well adapted and high yielding strains of corn, and who have, by years of careful selection, laid a foundation for the standardization of Michigan corn varieties. It is of the utmost importance to the individual grower and to the corn crop of the State that these better varieties be more widely



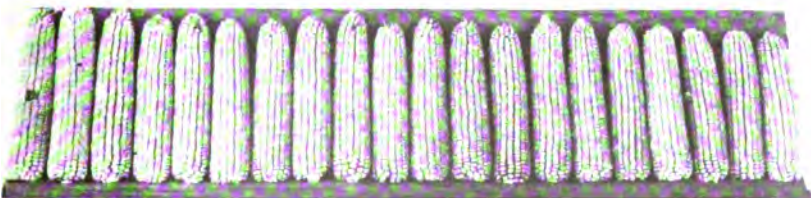
Early Silver King



Pickett Yellow Dent



Golden Glow



Duncan Yellow Dent

Standard Michigan Corn Varieties.

2. SOME STANDARD MICHIGAN CORN VARIETIES.

The Early Silver King and Duncan are well adapted to southern Michigan. The Gold Glow and Pickett are widely distributed, and adapted strains are grown in southern, central, and northern corn growing sections.

grown in the sections in which they are superior. It is also important that the methods of selection, and care of seed employed by Michigan's best corn growers in the development of these varieties be more widely employed.

By observing the yielding ability in the field of improved varieties for a number of years and assembling these varieties and numerous others of promise in carefully conducted variety tests throughout the State and at the Michigan Experiment Station, it has been made possible to designate, according to sectional adaptation, the leading corn varieties, which may be taken as dependable standards. Without doubt future experiments with corn varieties may develop even better strains and establish new varieties, which may replace many of the present ones, but it is certain that the varieties here designated have proven their adaptation and yielding ability, and are much superior to the majority of ordinary varieties usually grown.

APPROXIMATE SECTIONAL ADAPTATION OF LEADING MICHIGAN CORN VARIETIES

Section 1—Southern Michigan:

The Duncan Yellow Dent, Early Reed's Yellow Dent, Early Leaming, Murdock, Early Silver King, Folks White Cap, Golden Glow, Lawrence Yellow Dent, and Pickett Yellow Dent.

For silage these varieties and varieties from northern Ohio, northern Indiana, northern Iowa, and northern Illinois which are early enough to reach the dented and glazed kernel stage of maturity.

Section 2—Central Michigan:

Pickett, Golden Glow, Geddes Early Silver King and Folks White Cap. For silage, these varieties, and varieties from Section 1.

Section 3.—Northern Michigan:

Early Golden Glow, Wisconsin 12 and No. 25, Early Pickett, Northwestern Dent, Ogemaw White Cap and Flint varieties.

For silage—these varieties, and varieties from central Michigan.

Section 4:

No safe grain maturing varieties. The varieties of Section 3, are recommended for silage under conditions where silage can be produced.

The accompanying map shows graphically the approximate adaptation of varieties listed. It must be kept in mind that definite boundaries cannot be established, and that exceptionally cold and late soils in southern localities require early strains such as are characteristic of more northern sections, while favorably located, quick growing corn soils in northern sections, particularly near Lake Michigan, can produce later strains than the average soil of the region.

County Agricultural Agents and the Farm Crops Department of the Michigan Agricultural College are in position to give information concerning varieties and source of dependable seed for established corn growing sections.



8. Map indicating approximate sectional adaptations of leading Michigan corn varieties.

DESCRIPTION OF MICHIGAN CORN VARIETIES

In order to give definite information concerning varieties of known excellence as shown by variety tests, the men who developed these varieties, or have grown them for a number of years, were requested to state the methods followed in establishing their respective varieties. A brief summary of the history of each variety is included with following description:

EARLY SILVER KING

The Early Silver King is a white variety introduced into Michigan from two sources; from northern Iowa, where it originated, and Wisconsin, where it has been widely distributed after selection and adaptation, as the Wisconsin No. 7. The ear is usually from $8\frac{1}{2}$ to $9\frac{1}{2}$ inches in length and $6\frac{3}{4}$ to $7\frac{3}{4}$ inches in circumference. It ranges in season from 100 to 130 days. Food products industries using corn pay a premium for white corn. The following men who have been instrumental in introducing this variety have given brief statements of source and selection methods:

Farley Bros., Albion, Calhoun County, secured seed of Silver King seven years ago from northern Iowa. They followed hill selection and saved the best type of ears for seed. The estimated maturity is 110 to 120 days on soils of variable Coloma loam.

Mr. C. P. Milham, Kalamazoo, Mich., secured Wisconsin No. 7 strain of Early Silver King from Wisconsin nine years ago. He has practiced field selection of ears on the stalk for his own seed and selected for type from this field selected seed.

His soil is mostly clay loam or sandy clay loam. The average length of season required for maturity for this strain of Wisconsin No. 7 is 110 to 125 days.

Mr. D. A. Geddes, Swan Creek, Saginaw County, secured Early Silver King or Wisconsin No. 7 from Wisconsin nine years ago. It has been his practice to always gather seed before corn was harvested, picking the early maturing ears from hills containing 2 to 4 strong, well developed stalks, saving the ears that were 8 to 9 inches long, carrying 16 to 20 rows, with good length of kernel at the tip and butt, growing about half way up the stalk, the ears drooping slightly so that rain would not injure tip of ear.

The soil is a clay loam. The estimated time for maturity is from 100 to 115 days.

PICKETT YELLOW DENT

The Pickett Yellow Dent is one of the oldest and best established varieties of lower Michigan. The ear is cylindrical and slightly tapering, measuring from 7 to 9 inches in length and $6\frac{1}{2}$ to $7\frac{1}{2}$ inches in circumference. The number of rows vary from 16 to 20. The kernels are medium to deep, compactly arranged on cob. Adapted strains of this

variety are safe throughout Sections 1 and 2. It produces a medium stalk growth.

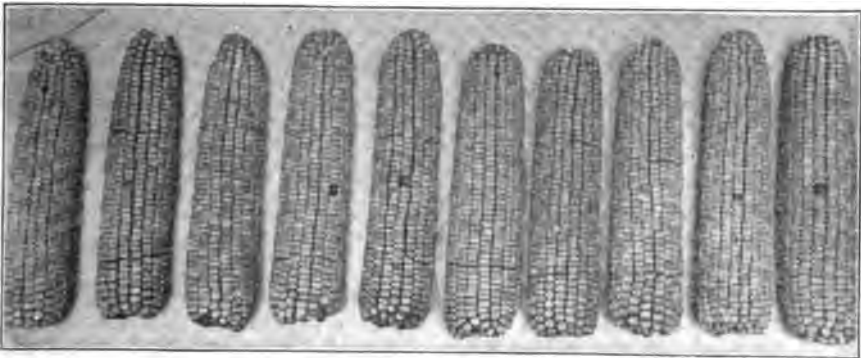
The Pickett variety is one of the most carefully selected native strains. It originated from a distribution of extremely early Reid's Yellow Dent, secured by the Michigan Agricultural College from northern Illinois in 1885. The original strain was too late for widespread success when introduced. After years of careful selection it has been made dependable over a wide area.

Mr. J. W. Pickett of Caledonia, Kent County, states the following regarding the Pickett variety:

Mr. W. E. Boyden, Delhi Mills, Michigan, secured some seed from the Michigan Agricultural College and grew it in 1889. Mr. Pickett secured seed from Mr. Boyden in 1890 and has grown it ever since.

The ordinary method of saving the best type of ears at cutting time and husking time was followed until 1906. In 1906 he commenced to improve his corn by testing out several selected ears by the ear row test and remnant method, planting a part of each ear and preserving the remainder for the purpose of bringing the high yielders together the following year in a breeding plat. He has followed these methods with modifications since that date.

According to type selected, the Pickett corn requires from 95 to 110 days for maturity. This variety was developed on clay loams and loams.



4. PICKETT YELLOW DENT

One of Michigan's oldest and most highly improved varieties. Known as a dependable grain maturing variety in southern and central Michigan.

DUNCAN YELLOW DENT

The Duncan Yellow Dent was developed by Mr. J. R. Duncan of Vicksburg, St. Joseph County. This variety is fairly well known in southern Michigan counties. The ears range in size from 8 to 9 inches, and carry 16 to 20 rows of kernels. The kernels are keystone shaped, medium deep, with remarkably large germs. The stalk is broad leafed and vigorous.

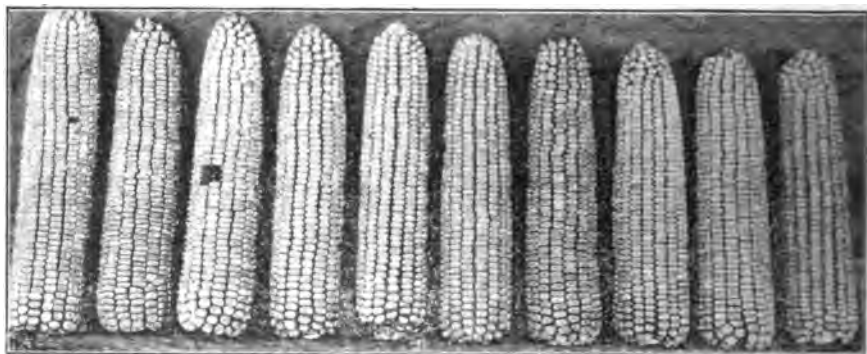
The seed which formed the basis of the present variety was bought in 1908 at Ossian, Indiana.

The method of selection followed was as follows:

Selection always from standard stalks. Ear to row work followed two years. Briefly stated, the best ears from strong, medium sized,

disease free stalks, standing in a full hill and surrounded by a full stand, were selected in the field before husking time. The best type from these ears was later selected for seed. The average length of season required for maturity is 110 to 130 days. The soil on which the Duncan was developed is a loam, fairly light in nature.

At present Willis Wahl and Schrader Bros. of Centerville, Michigan, are continuing the work of improving this variety in St. Joseph County. Earlier strains of Duncan, which have been brought out by ear row work at the Michigan Agricultural College, will be distributed in 1920 and 1921 throughout central Michigan.



5. DUNCAN YELLOW DENT

An excellent variety for southern Michigan and well liked for silage purposes in south-central counties.

THE GOLDEN GLOW VARIETY

This yellow dent variety was introduced from Wisconsin. It is a vigorous grower of wide adaptation. The ears are of a golden yellow color, slightly tapering, 7 to 9 inches in length, and from $6\frac{1}{2}$ to $7\frac{3}{4}$ inches in circumference. The kernels are of a keystone shape for southern Michigan strains and a keystone to round for northern Michigan. The rows number 16 to 20.

Strains of this variety are grown in all Michigan corn growing sections. It is of particular importance in the central and northern districts.

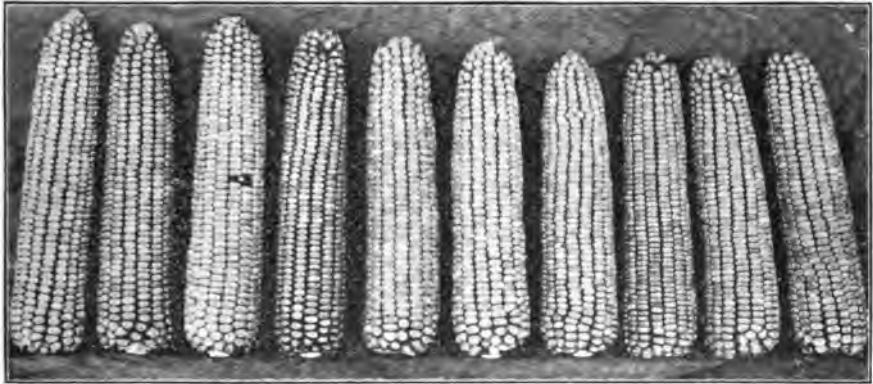
Mr. C. V. Town, of Greenville, Montcalm County, states the following in regard to Golden Glow:

He secured seed four years ago from Jefferson County, Wisconsin. Selected seed from portions of the field where the most perfect development was to be found, avoiding the high ground where for lack of moisture the fertile plants might become dwarfed in anyway. He also avoided the low places where lack of fertility might cause undue stalk growth and a tendency to late maturity. He selected seed from stalks where stand is full, avoiding the ear set on long shanks, or ears set too high or too low on the stalk. In selecting seed ears Mr. Town avoided ears with course, open butts or long tapering tips with pointed kernels.

Mr. Town began ear to row work in 1919 with 55 ears from the best

stock obtainable from above method of selection. His soil is mostly clay loam, and time of maturity estimated at 110 to 120 days.

Mr. Olaf Nelson, Aloha, Cheboygan County, states that the original source of the Nelson's Golden Glow was the Wisconsin Golden Glow of, an early strain from Wisconsin. The selection has continued 4 years in Cheboygan County.



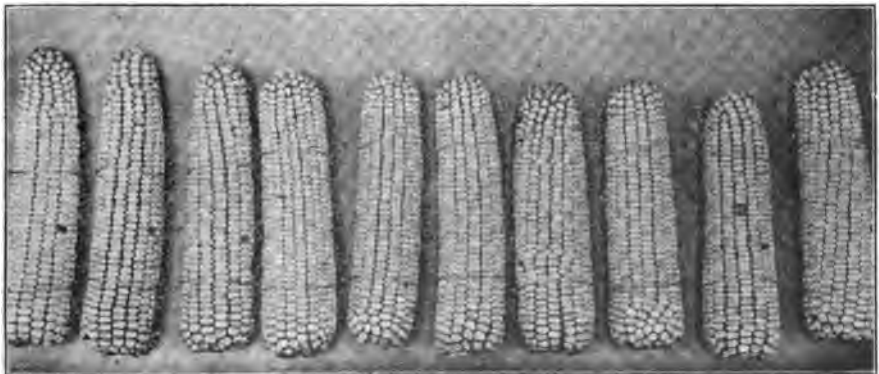
6. GOLDEN GLOW.

A widely adapted variety. Larger strains are available for southern Michigan, earlier strains for central Michigan, and extremely early Golden Glow is grown in northern counties.

The seed is carefully field selected, saving those ears true to type, such ears as are fully matured and free from disease. The seed is hung in the seed house, kept from frost and dried by artificial heat.

Early maturity is one of the chief points considered in selection work.

The soil is loam with clay sub-soil. The time of maturity is 95 to 105 days.



7. FOLKS' WHITE CAP.

A high yielding, early maturing variety, well adapted to south central and southern Michigan. (Sec. 1 and lower part of Sec. 2)

EARLY GOLDEN GLOW—WISC. No. 12 & 25

The Wisconsin No. 12 usually matures in northeastern Michigan, with only occasional failures. It produces fairly large ears, kernels rather short, and cobs somewhat large for damp autumn seasons. This strain of Golden Glow is adapted to Section 3, particularly the southern and western area.

The type Wisconsin No. 25, of early Golden Glow matures about 10 days earlier than type No. 12. The kernels are rather short and ears about the size of the Ogemaw White Cap. The stock of No. 25 was obtained from the northern Wisconsin Experiment Station at Spooner, Wis. This early strain is best adapted to northeastern Michigan and the upper regions of Section 3 and Section 4.

FOLKS' WHITE CAP

This variety was developed by Mr. William Folks of Hanover, Jackson County. It is an exceptionally uniform white cap variety and has given excellent yields in southern and south central Michigan variety tests. It has a vigorous stalk and is highly appreciated both for grain and silage purposes. The ears range from 7 to 9 inches, are slightly tapering, and carry 16 to 20 rows of kernels of medium depth. Mr. Folks has given attention to the selection and improvement of this corn since 1905. It is one of the best yielding varieties for southern Michigan.

LAWRENCE YELLOW DENT

This variety was originated by Mr. L. L. Lawrence, of Decatur, Mich. It is a yellow dent variety, well adapted to southwestern Michigan. The ear ranges from 8 to 9½ inches in length, carries from 16 to 22 rows of kernels. The kernels are of medium depth, and the indentation is rough.

Mr. Lawrence states that he "has grown this corn upwards of 20 years on slightly sandy loam, underlain with clayish, gravelly sub-soil." He has practiced hill selection and estimates the maturity of his corn at 100 to 120 days. The original strain was a Turkey-track type. The present strain of Lawrence Yellow Dent shows only occasional red hull markings.

EARLY REIDS' YELLOW DENT

The early strains of Reids' Yellow Dent mature safely in Michigan's southern-most counties. The leading variety in Branch County variety tests, for the past 2 years, has been an Early Reids', grown by Mr. Coffman for the past 11 years.

The ears are from 9 to 10 inches in length and carry 16 to 20 rows of kernels. The color is medium yellow, the sides of kernels being slightly darker yellow than crown. The kernels are broad and fairly deep, with large germs, and compactly arranged in row. The cob is small, ears cylindrical, butts and tips well curved.

This variety matures safely in favorable locations of Michigan's southern tier of counties and is utilized as a silage variety throughout southern Michigan.

EARLY LEAMING

The Leaming is recognized as one of the oldest varieties. It has undoubtedly formed the foundation of several Michigan corn varieties. Earlier strains of Leaming mature in southern Michigan and it is well known as a silage variety in southern and central Michigan. The ears very from 7½ to 9 inches in length and are characterized by a distinctly tapering shape. The indentation of kernel is smooth, grains medium to deep and variable in thickness. The color of Leaming is a medium yellow tinged with golden. This variety is too long seasoned to be grown safely, except on the good corn growing soils of southern Michigan counties.

MICHIGAN YELLOW DENT

This variety, developed in Jackson County, is grown chiefly in southeastern Michigan. The ears are from 8 to 9 inches in length with 16 to 18 rows of kernels of medium depth and medium indentation. The ears are symmetrical and quite uniform. This type is dependable in yield and adaptation in southern Michigan counties.

PRIDE OF MICHIGAN

The Pride of Michigan is a yellow dent variety of long standing in southern Michigan. Early strains are established as far north as Saginaw county. The type is thoroughly acclimated in southern Michigan. The ears are uniform in size, slightly tapering, being from 8 to 10 inches in length with 16 to 20 rows of kernels of medium depth. Color is light golden. This variety is recommended for southern Michigan and early strains for central Michigan.

NORTHWESTERN DENT

The original stock of the Northwestern Dent variety was secured from North Dakota, 8 years ago by Mr. E. E. Evans of Ogemaw county. As received, the stock was mongrel, showing variations from dark turkey red to yellow and many types of kernels:—Dent, Hackberry, and Flint. The improved strain of Northwestern Dent bears little resemblance to the original stock. The cobs are small, drying out readily and quickly. The kernels are the deepest of any dent corn grown in northern Michigan which matures regularly; color, reddish with pale caps. Light colored ears appear rarely in improved stock.

This stock matures safely in north-central Michigan.

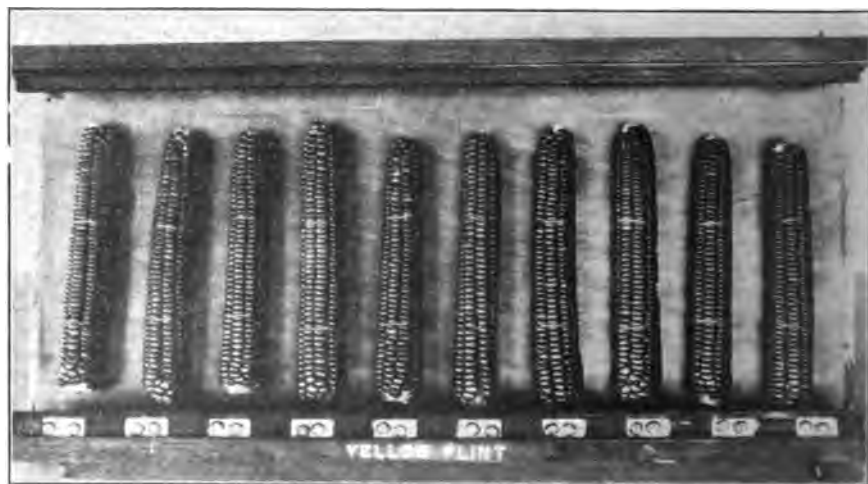
OGEMAW WHITE CAP

The Ogemaw White Cap is a white cap variety, 5 to 6 inches long, maturing in from 90 to 100 days and adapted to northeastern Michigan. It was originated by Mr. E. E. Evans of West Branch, Ogemaw county, from stock obtained from Calhoun county 26 years ago. This variety is a standard variety of Ogemaw and neighboring counties.

EARLY FLINT VARIETIES

Early Flint varieties are as a rule the earliest grain maturing varieties. The 8-Row Yellow, Early Mohawk, King Philip, Smut Nose or Red Blazed, and Rainbow Flint are the best known Michigan varieties. Of these the 8-Row Yellow is one of the earliest, maturing in from 80 to 90 days.

The Smut Nose or Red Blazed Flint is one of the most widely grown flint varieties. The color is yellow, and the tips of smutty or bronzed appearance. The ears are usually 8 rows, from 9 to 11 inches in length. The stalks are about 7 feet high.



8. Flint varieties are adapted to regions of short seasons in northern Michigan, and are used occasionally for replanting or planting at late dates in southern and central Michigan.

The King Philip Flint is one of the oldest varieties and known as a productive strain, often bearing several ears per stalk. The ears are from 10 to 13 inches long; the color deep red with occasional light crowned kernels. It is shown as a hardy flint variety and is a vigorous stalk producer.

The Early Mohawk was developed in northern Michigan counties from a variety from New England. It is a large type with ears from 10 to 13 inches long; red in color, with lighter color at crowns of kernels.

The Rainbow Flint is a mixed vari-colored strain found growing in Alpena and Presque Isle counties.

The Yankee Dent or Poorman's corn is an early variety intermediate between Dent and Flint, having broad, shallow, pale yellow or cream colored kernels. This variety is adapted to sections of short seasons and poor soils, and is sometimes used for replanting or planting at late dates in central and southern Michigan.

Flint varieties are adapted to planting in sections with too short a season for the proper maturity of Dent varieties. During recent years early types of Dent corn have rapidly replaced the Flint varieties.

VARIETIES FOR SILAGE

The highest yields of food material per acre are secured from corn which reaches maturity. Under average conditions, a variety which reaches the dented and glazed kernel stage of maturity, with the lower leaves of plant turning brown, will produce the most nutritious and most palatable silage. Approximately two-thirds of the digestible food value of corn is in the ear, and hence varieties which produce a good ear will make silage of richest feeding value. It is possible, however, to grow varieties that will not produce sufficient tonnage and mature too early for ensilage. Large growing leafy plants, which will produce ears that reach the dented and glazed stage or hard dough stage of maturity, fill all requirements. Corn which has reached full maturity is usually too dry to produce the most palatable silage, even though water is added.



9. The silo has extended Michigan's corn growing section far to the north and provides insurance against loss of crop during seasons of early fall frosts.

The Silver King and Duncan varieties, for instance, are splendid silage varieties in central Michigan, while in southern Michigan Reid's and Leaming, of northern Ohio and northern Indiana, make excellent silage corn. In northern Michigan the Golden Glow, and Early Silver King from central Michigan, make good silage.

Extremely large growing types, such as the Red Cob Ensilage, furnish a large yield per acre of silage material, carrying a much higher water content and less food value than silage of greater maturity. The dairyman, living near large cities with a limited acreage, who buys most of his feed, may find these types of use in giving him the largest yield of succulent roughage per acre on his high priced land. The average dairyman and farmer, however, usually has plenty of land and is more limited in silage space and desires to save as much as possible on concentrates. For him, a thrifty variety which reaches a more advanced stage of maturity is the best for silage.

VARIETY TESTS FOR CORN

In view of the variability of the soil and climatic conditions in Michigan, and hence the great variation in adaptation of corn varieties, the Farm Crops Department has found it advisable to conduct numerous corn variety tests well distributed over the State, as well as at the Experiment Station.

These tests show that there is a great difference in the yielding ability of varieties grown in all Michigan corn localities. Some strains will out-yield others by 40 to 50%. Taking the year 1919, for example, in 24 tests the average of the highest yielding varieties was 59.21 and the average of the lowest yielding varieties was 35.44 a difference of 23.77 bushels.

Without doubt, if the leading varieties of various districts were adopted as standards, corn yields would be greatly increased. Corn variety tests, the past few years, have shown that there are many local varieties of merit which should be more widely grown.

The accompanying table, No. 2, gives the yields of typical varieties in tests held in a number of Michigan counties in 1919.

Table No. 3 gives the yields of a number of representative Michigan corn varieties in variety tests conducted at the Michigan Agricultural College.

SOUTHERN

The above summary of twenty-four variety tests shows an average range in yield of 23.77 bushels between the highest and lowest yielding varieties. It indicates the need of such tests covering a series of years in all corn growing localities in order to ascertain which standard or local variety is best suited to be accepted as the best variety for the locality.

TABLE NO. 3—
VARIETY TEST, EXPERIMENT STATION 1919

Variety Name.	Market Quality.	Moisture in %.	Shelling %	Bushels per acre including 14% moisture.
Golden Glow (check).....	793	352	863	86 35
Duncan.....	756	400	864	78 33
Early Silver King.....	822	392	849	75 29
Golden Glow (check).....	825	352	863	86 35
Pickett.....	731	348	876	70 96
White Cap Folks.....	703	37	876	81 64
Golden Glow (check).....	863	352	863	86 35
Pride of North.....	703	417	864	56 23
White Cap Ogemaw.....	677	29.5	83.8	49 43
Golden Glow (check).....	785	352	863	86 35
Golden Glow B. Wisc.....	832	351	852	85 90
Golden Glow M. Wisc.....	698	301	848	70 97
Golden Glow (check).....	743	352	863	86 35
Shovar Y. Dent.....	751	339	864	77 96
E. Silver King, Saginaw.....	725	335	882	74 11
Golden Glow (check).....	778	352	863	86 35
Golden Glow.....	728	30	849	63 97
Golden Glow, Cheboygan.....	667	324	846	67 23
Golden Glow (check).....	807	352	863	86 35

THE LESSON OF 1917 AND 1918

The costly and almost disastrous experience of 1917 and '18, demonstrated beyond argument that the ordinary methods of selecting and curing seed corn practiced up to that time, were not dependable. The safety of the entire crop was endangered by the abnormal weather conditions of the fall of 1917, and extremely severe winter weather of 1917 and '18, and the lack of widespread selection in the field and proper curing of seed corn. Even in an average season there is a great loss in yield through the failure on the part of a great number to follow proper methods of seed selection.

During the early spring of 1918, it was necessary for the Michigan War Preparedness Board to secure from outside sources approximately 100,000 bushels of seed, or about two-fifths of the seed corn planted in Michigan, in order to plant a nearly normal acreage. This corn was brought largely from New York, New Jersey, Delaware and South Dakota. The eastern corn was of high germination and proved to be excellent for ensilage purposes. The western corn was not in such good condition, but proved in many instances, to be well adapted for grain purposes and will undoubtedly prove to be of lasting influence, particularly the Wimples and Silver King varieties distributed in southern Michigan.

The dire conditions resulting from the adverse conditions of 1917 and '18, were met successfully, chiefly due to the fact that Michigan's War Board realized the great importance of the corn crop, during war

times, and advanced approximately \$350,000 to serve as a revolving fund for the purchase of seed corn. Their action resulted in securing enough seed at an early date for the production of an almost normal crop. During peace times, it is extremely doubtful that a like fund could be made available. Should the same weather conditions result as in the fall of 1917, and find the same methods followed in selecting seed, Michigan farmers would face a much greater loss than was experienced in 1918.

The wide spread field selection of seed corn in the fall and the proper storing of early selected ears would make such a calamity to the corn crop, as was threatened in 1917, impossible, and would greatly increase annual returns. It is sincerely hoped that a number of favorable seasons will not lull Michigan farmers into a sense of false security, and that the practice of field selection and proper storing of seed corn will be more wide spread than it was even in the fall of 1918, following the great seed corn famine.

No two factors will go further toward immediately increasing the yields of corn in Michigan, than the proper selection and handling of seed corn.

SELECTING AND CURING SEED CORN

The common practices of selecting seed corn from the crib or when husking the general crop are too costly to be continued. Such corn usually germinates poorly and may result in poor stands. It is extremely important that the most mature and highest yielding corn of each season's crop be selected in the field and properly stored to furnish seed for planting the next spring.

ADVANTAGES OF FIELD SELECTING SEED CORN

The great advantage of selecting seed corn in the field before the crop is harvested lies in the fact that mature corn is secured and that a study of the plant on which the ear grew and of its environment can be made. In selecting from the shock or from the crib little is known of the parent plant or the conditions under which it grew. Corn which has stood in the shock or in the crib is more or less seriously injured by the development of molds or by freezing while in a moist condition.

It has been demonstrated that the corn plant is easily altered by proper selection methods. Yield, time of ripening, position and character of ear and even feeding value can be changed within wide limits. Field selection and proper storing as compared with prevailing selection methods will usually increase the yield of ordinary corn varieties from seven to ten bushels per acre. Enough corn to plant twenty acres can be easily field selected in a day's time by one man. With a seven-bushel increase per acre the corn grower who plants twenty acres of corn will be rewarded with 140 bushels in his next season's crop or at present prices \$140 a day or more for his labor in field selecting and storing—admittedly a profitable day's work.

HOW TO FIELD SELECT CORN FOR SEED

The proper time to field select seed corn is in late September or during October when corn is sufficiently mature and ready to husk. In making the selection, the best way is to walk down the rows with a sack tied over the shoulders, or carrying a basket, plucking those ears which are considered desirable. Mature ears borne on vigorous plants growing under average conditions, which are carried at the right height, about the center of the stalk or just below, and with tips slightly drooping, should be selected, then properly stored. Ears should not be taken from lodged or "down" stalks, since the root systems of such plants may have been weakened by fungous diseases, which may be carried in the seed.

If field is to be harvested for silage, or is immature, due to early frost, vigorous plants carrying heaviest and most mature ears should be cut and shocked at edge of field. After standing for several days or until ears are firm, the ears should be husked and cured for seed.

Further selection for uniformity of type and composition can be made through the winter or when making the germination test. By proper field selection, any farmer in Michigan has it in his power to markedly improve his corn variety.



10. Good seed corn can only be secured by selecting in the field from standing stalks, drying immediately and storing properly.



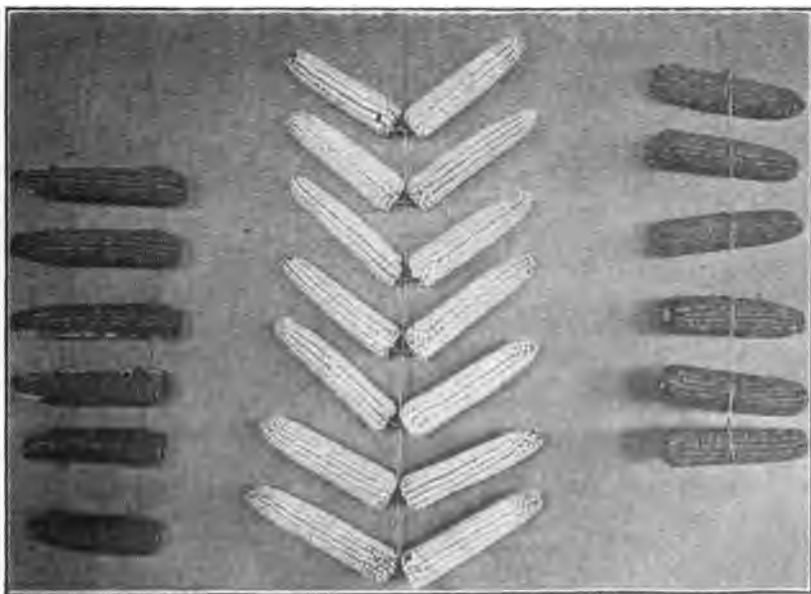
11. Selecting seed corn before cutting for silage.

Vigorous stalks carrying sufficiently matured ears are cut and shocked at edge of field. The ears are husked and cured for seed after standing in shock until kernels are sufficiently firm.

(Picture taken on farm of Jason Woodman, VanBuren County, Sept. 1919)

CURING AND STORING SEED CORN

Good seed corn can only be secured by thoroughly drying carefully selected ears before being exposed to freezing weather. In late September and during October, corn as it comes from the field contains from thirty to forty percent moisture. In this condition it is easily damaged by molding and freezing. In order to retain its vitality it must be rapidly dried so as to pass through the winter with a moisture content of twelve to fifteen percent.



12. Practical methods of drying seed corn. Free ventilation is necessary for rapid drying.

Immediately after harvest, corn for seed should be placed where it will receive free ventilation in order to dry rapidly. No two ears should be allowed to touch. Many excellent devices for drying and curing seed corn are in common use. The ears may be strung on binder twine and hung from a rafter. Wire racks on which the ears are impaled may be made from woven wire fences, or may be purchased. Racks may be easily constructed from two-by-fours and laths on which the ears may be laid. These racks should be placed in the attic or spare room in the house, tool room, etc. A well ventilated room is necessary. A cellar without furnace is as a rule a poor place to store seed corn. During the early period of drying all windows should be opened so as to remove excess moisture.

Corn properly dried will not be greatly damaged by freezing but it is best to store where it will not be exposed to extreme cold.

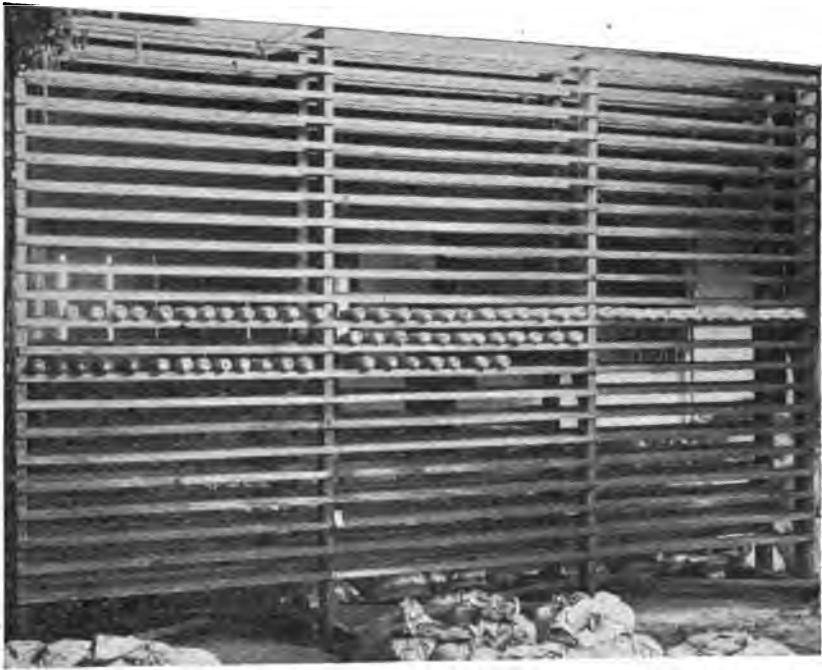
Where large amounts of seed are to be handled, special corn drying houses are desirable, equipped with numerous windows or panels which will give free circulation of air, and a stove to furnish artificial heat to hasten drying and prevent freezing.

SEED CORN DRYING HOUSE

For the man who wishes to engage in the production of improved seed corn and its sale for seed year after year, a seed corn drying house is essential. In even the most unfavorable fall and winter seasons, corn may be properly dried and protected from freezing by the use of artificial heat used in connection with proper ventilation. A drying room or drying house, given over entirely to corn can be safe-guarded against mice and insects and will provide an excellent place for selection for improvement during the winter. Since it can be kept under lock and key, children and strangers will not disturb the work under way.

Such a drying house can be built at a cost of from \$200 to \$500 and will have a capacity of from 800 to 1000 bushels. During a season such as 1917, a corn drying house filled to capacity would have been paid for several times over in the resulting sale of properly cured seed. The drying house also furnishes a proper room for preparing corn for shipment, ear row work, keeping records, etc. It should be equipped with racks or hangers of a convenient type, should be provided with free ventilation and heated for at least three weeks after the corn is first hung with all ventilators open. During a cold snap, heat should be applied during the winter. The cheaper type of round bellied stoves, or an old stove that has been discarded will furnish sufficient heat.

A number of these corn drying houses, say five or more to each county in central and southern Michigan, will insure the planting each year in Michigan of seed corn of high germination. The best corn for Michigan, generally speaking, is native Michigan grown stock. For silage purposes in northern Michigan there are no better varieties than corn from central Michigan, and in central Michigan, either home grown stock or corn from southern Michigan, will prove best for silage. The men, who make it a business of growing seed and are properly equipped for curing and preparing for shipment, can be assured of profitable returns.



13. A seed corn rack, which insures proper curing, made from 2x4's and lath.



14. A seed corn Shipping Crate.

Corn shipped on the ear should be carried in crates which will provide free ventilation and protect from mice or rats. The space at side is screened with fly screen.

TESTING GERMINATION

"Test don't guess" was first applied to corn by Mr. P. G. Holden, a native of Michigan, in pointing out the importance of testing the germination of each ear of corn to be planted. Careless methods of storing seed corn make it absolutely imperative that seed corn should be tested before planting.

Experience has shown that it is impossible to surely distinguish, by outward appearance, or the knife blade test, between ears of good germination and ears of low vitality. The only accurate method is testing in the germinator. The sawdust box, sand box or rag doll tester, and special manufactured seed corn germinators are all efficient.

THE SAWDUST BOX TESTER

Construct square box 2 ft. by 2 ft., 3 inches deep. Cut piece of white cloth to fit and mark off in center with heavy lead pencil a square 20" x 20"; divide into 100 squares 2" x 2". Number upper squares 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 at top, and left side row 1, 11, 21, 31, 41, 51, 61, 71, 81, 91.

Place one inch of sawdust moistened in warm water in bottom of box, pack firmly and smooth evenly. Moisten marked cloth and spread over sawdust on box.

Number ears to be tested and place where they will be undisturbed. Extract with penknife six kernels from each ear beginning near butt and turning ear slightly as each is extracted taking last near tip. Place kernels in square numbered to correspond with ear, germ face up, tips toward the bottom of box.



15. 100 ears can be tested at one time in the sand or earth box germinator, shown above. Six kernels from each numbered ear are planted, germ face up, tips down, in each square. The rows at edge of box are numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and along top 1, 11, 21, 31, 41, 51, 61, 71, 81, 91, thus indicating the number of each square. Numbers ranging from 1 to 10 are attached to ears to be tested, and kernels from each ear planted in square of corresponding number. The sand or earth is kept properly moistened and test is ready to read in from 10 to 14 days. Six strong sprouts in a square show desirable seed ears.

When all squares are filled, cover with moistened cloth 22" x 22". A third cloth or sack should be spread over box and 1½" of moist sawdust spread evenly over top.

Place box in warm room in slightly inclined position so that the tips point down.

Inspect after several days and moisten if necessary. The test is ready to read in seven days. In taking test, roll back upper cloth, removing sawdust and carefully remove cloth over kernels.

Kernels from good ears should show vigorous sprout and root development. Kernels which fail to grow, or which produce weak sprouts, or moldy sprouts, come from ears unfit for seed and the ears corresponding to their numbers should be discarded.

THE RAG-DOLL TESTER

Cut cloth (cambric, muslin, or flannel) into strips five feet long and ten inches in width. Bisect lengthwise with heavy pencil line. Beginning about fifteen inches from end draw eleven cross lines at right angles to center line, three inches apart. Number spaces from one to ten on upper side of line and eleven to twenty on lower side.

Select and number ears to be tested. Dampen cloth and lay out smoothly on table. Remove six kernels from different parts of ear



16. The Rag Doll test is convenient and dependable.

Kernels which show strong sprouts, free from mold or other fungous growth, indicate ears which are safe for seed purposes. Kernels, which fail to sprout or produce weak or moldy sprouts, indicate ears which should be discarded.

number one and place germ side up in space number one, tips pointing in same direction. Proceed with each ear in like manner. When spaces are filled roll carefully so as not to displace kernels and tie roll around center with string, place each roll as finished in bucket, cover with lukewarm water for several hours. Drain, and cover top with damp cloth or newspaper. Place in warm room. After several days moisten with warm water. On seventh day test is usually ready to read.

To read test unroll cloth carefully on table and study kernels in each square. Discard all ears corresponding to squares showing dead kernels which produced weak sprouts or mouldy sprouts. Save for planting ears with kernels showing strong, clean, stem and root sprouts.

COMPOSITE TEST

To test germination of shelled corn or to secure approximate condition of ear corn a composite test of 100 kernels should be made. In taking samples of ear corn, extract 100 kernels from each of 100 ears representative of entire lot. Place kernels in rag doll or sawdust box. After seven days count kernels which show strong germination. It will pay to ear test corn of less than 95% germination.



17. A good sod, plowed in fall or early spring makes an excellent foundation for a big corn crop.

THE CULTURE OF CORN

Corn thrives best on loams and clay loams, sufficiently drained, and well charged with organic matter and the mineral elements of fertility. It is not well adapted to light sandy soils or poorly drained soils. It is often possible by the addition of manure, the turning under of a green manuring crop, and applications of mineral fertilizers, to make light loams produce good crops of corn. It is also possible to drain poorly drained clay and muck areas and secure good yields from sufficiently early varieties, but the most profitable and successful crops result on fertile loams and clay loams, and it is on these soils that extensive corn production occurs and should be most largely encouraged.



18. Spring plowed land should be packed firmly with roller or cultipacker in order to firm lower part of furrow slice. After rolling, the ground should be disced or harrowed.



19. Thorough sifting of seed bed before planting corn greatly lessens labor of later cultivation

PREPARING CORN LAND

Fall plowing or early spring plowing to a depth of 7 inches or more, is the best beginning for a good seed bed for corn. Frequently the gain in crop yields resulting from early and deep plowing in fall or early spring, as compared to late spring plowing, is sufficient to more than offset the entire cost of plowing. Moisture is retained, the seed bed settles firmly, and insects are largely controlled when land is plowed in the fall.

Fall plowed land should be allowed to go through the winter in the rough, that is, as turned. In this shape it catches and holds snow and absorbs rain. As soon as in condition to be worked, fitting with disc, harrow or spring tooth should begin in the spring. Early spring plowing should be followed by roller and harrow.

The thorough fitting of the seed bed for corn saves labor in later cultivations, as well as increasing the yield. At intervals of ten days or two weeks either fall or spring plowed land should be harrowed or disced thoroughly, beginning as soon as ground can be worked in the spring. When fitting the seed bed weeds can be most economically controlled, and a great saving accomplished in the time and expense necessary in controlling weeds after planting the crop. Harrowing and discing before planting are much less costly methods of weed control than cultivating between the rows, and in these times of high labor-cost, thorough preparation before planting is an important step towards economy of production.

It is usual to plant corn after sod, applying manure before plowing. Sod land is generally more easily prepared in the fall and early spring. The early plowing gives time for the thorough incorporation of sod and manure with the soil. Corn planted on land prepared late in the spring is much more liable to injury from drought, insects, and weeds.

When it is necessary to plow late in the spring for corn, the ground should be very thoroughly rolled to compact firmly. The rolling should be followed by thorough and frequent discing and harrowing.

A good seed bed for corn should be well settled at the bottom of the furrow slice and as approaching the condition known as "garden tilth" as nearly as possible at the surface.

FERTILIZING THE CORN CROP

Corn makes excellent use of manure. Applications previous to plowing or when fitting the land of 6 to 8 tons of manure are followed by a marked increase in yield. The use of Acid Phosphate, or a fertilizer high in Phosphorus, in connection with manure, results in further increasing the yield and noticeably hastens maturity. The application of 200 to 300 lbs. of Acid Phosphate or of a commercial fertilizer high in Phosphorus, is recommended.

On light or badly run land, a complete fertilizer such as a 2-10-2 or a 2-8-2, carrying Nitrogen, Phosphorus, and Potash may give good returns.

On muck soils fertilizers high in Potash and Phosphorus are necessary for continued success with corn.

Best results are secured from fertilizer by applying broadcast when fitting seed bed. An amount of more than 150 lbs. per acre, drilled in the rows, may cause concentration of corn roots close under the hill, or injure sprouting seed, thus leaving the crop in poor condition to withstand periods of drought. On light soil, when planting late under dry conditions, the use of not more than half this amount may be advisable.¹

YIELDS PER ACRE OF MANURED CORN IN A CORN, WHEAT, AND CLOVER ROTATION, 1911-1916

Treatment per acre.	1911.	1912.	1913.	1914.	1915.	1916.	Average for 6 years.
No manure or fertilizer.....	38.5	41.3	46.8	20.3	32.0	20.0	33.2
5 tons yard manure.....	45.7	46.3	51.0	38.1	40.9	26.1	42.4
5 tons stall manure.....	45.7	46.3	56.6	38.1	43.0	26.2	42.7
5 tons stall manure.....	57.0	48.4	60.8	46.7	47.4	32.0	48.7
200 lbs. acid phosphate.....							
5 tons stall manure.....							
5 tons stall manure.....	51.0	49.3	57.2	48.2	43.0	28.4	46.2
200 lbs. flats.....	52.0	48.5	65.7	51.6	48.8	28.7	49.2
10 tons stall manure.....							

The foregoing results from rotation and fertilizer experiments at the Michigan Agricultural College, covering a period of six years are reported by Professor V. M. Shoenesmith in the annual report of the State Board of Agriculture for 1917, Farm Crops Division:



20. Acid Phosphate, other commercial fertilizers, or lime are most conveniently applied at time of fitting the seed bed. An application of from 200 to 250 pounds of Acid Phosphate usually gives marked increase in yields of corn and hastens maturity.

1. For further information relative to use and application of commercial fertilizers, refer to Regular Bulletins No. 290 Soil Fertility; and No. 284, Some Information and Suggestions concerning the use of Phosphorus,—by this station.

PLANTING CORN

The most favorable time to plant corn varies with the latitude, altitude, soil and drainage condition, and location with reference to large bodies of water. In southern Michigan the average range of the best period for planting is from May 1st to 20th; in central Michigan counties May 10th to 25th; and in the northern part of the Lower Peninsula and in the Upper Peninsula May 20th to June 5th. In general, early plantings within the periods named are advisable. In exceptionally early seasons corn can be planted safely at an earlier date than given above and in extremely late seasons the planting time may be delayed to a later date than indicated.

The best time to plant corn varies also with individual seasons; hence, the old sign of the Indians for a safe planting time—"when the leaves of the White Oak are the size of squirrel's ears"—can be taken as an excellent guide. Long years of observation have proven the dependability of this Indian sign.

Rate of Planting:

The advisable rate of planting depends on length of growing season and fertility of soil. In southern Michigan counties on fertile corn ground the usual method is to plant in hills 42 to 44 inches apart, dropping three kernels per hill or drilled in rows 42 to 44 inches apart dropping a kernel every 14 inches. On lighter soils of the extreme southern counties it is usual to plant 2 kernels per hill 44 inches apart.



21. Corn starts best on a well surfaced seed bed with furrow slice well settled.

In central Michigan the usual distance between hills is 38 to 42 inches, dropping 3 kernels per hill or planting in rows 38 or 42 inches apart with a kernel every 12 to 14 inches.

In northern Michigan, sections 3 and 4, corn is usually planted in hills 3 or 4 kernels per hill, 36 to 38 inches apart. The varieties are smaller and seed can be planted thicker.

For silage the rates above mentioned may be used if part of the field is to be handled for grain. Somewhat thicker planting, drilling in rows 36 to 42 inches apart with kernels every 10 inches apart, will increase the tonnage.

For grain purposes from 4 to 5 quarts per acre is sufficient, and for silage purposes the rate of planting ranges from 5 to 8 quarts per acre.

The depth of planting corn varies with the soil. On well drained loams $1\frac{1}{2}$ to $2\frac{1}{2}$ inches is the proper depth and on heavy clay or clay loams 1 to 2 inches.

CULTIVATING CORN

It is an excellent practice to harrow immediately after planting with smoothing harrow. On heavy land it is safe to use a spike tooth harrow, with teeth set slanting, until the corn appears above the ground. The weeder may be employed until the corn is 6 to 8 inches in height. The first cultivation with the corn cultivator may be made as soon as the corn is high enough so that the rows can be easily followed. This cultivation should be deep, at least 4 or 5 inches and close to the rows. The second cultivation should come from 5 to 8 days later, and should not be quite so deep. Throwing dirt to the plants when making early



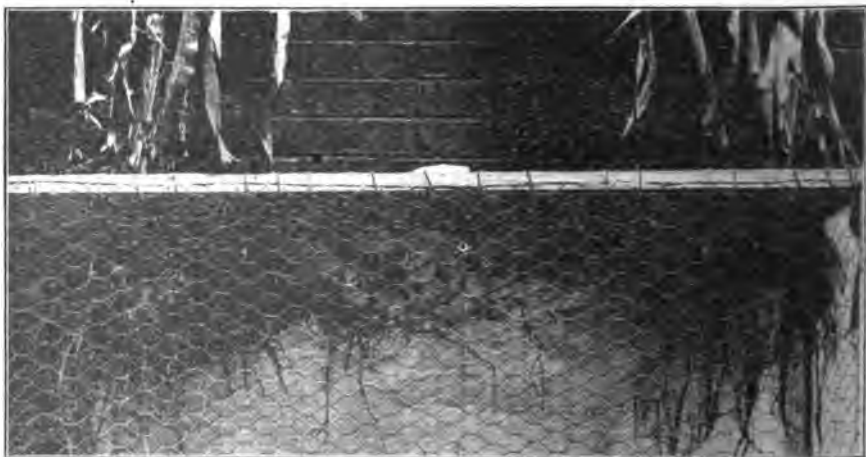
22. Frequent shallow cultivations are necessary to control weeds and keep surface in good tilth.

cultivations, covers and kills small weeds in row. The following cultivations should be made at intervals of one week to ten days, and should be shallow, not going to more than 3 inches in depth. Care should be taken not to approach too near the corn plants, in later cultivations, thus causing injury through pruning feeding roots. It should be kept in mind that after a period of 35 to 40 days' growth, the roots of the corn plant interlace between the rows, and closely approaching the surface, filling the space between the hills with a dense net-work of fine feeding roots. Cultivation deeper than 2 or 3 inches or too close to the plant at this time will cut these important feeding roots, and cause a decrease in yield.

From four to six cultivations are usual, depending on the season. Additional cultivations generally give a slight increase in yield, but too

many cultivations may cost more than the increase in yield will pay for. The number of cultivations necessary will depend on the season and the condition of the land. It is imperative that cultivation be sufficiently frequent to effectively control weed growth. Thorough preparation before planting will lessen the number of cultivations necessary as compared to land not so well fitted.

Cultivators carrying numerous small shovels or blades, designed to accomplish thorough surface cultivation, have rapidly displaced the old type of corn cultivators carrying larger and fewer shovels.



23. After forty days' growth corn roots interlace between the rows close to the surface. Shallow cultivation is advisable to prevent pruning of surface feeding roots.

HARVESTING CORN FOR GRAIN

Corn is ready to harvest when fully mature or when growth is stopped by heavy frost. In Michigan the usual method is to cut and shock, husking later from the shock and storing in cribs.

Under average conditions, the moisture content in Michigan corn, at the time of harvest, ranges from 25 to as high as 40%. It is, therefore, advisable to store in cribs properly constructed to offer proper ventilation. The cribs should be made narrow, or if broad, should be provided with central ventilation, made of properly spaced boards or of wire attached to frames.

The accompanying picture No. 24, shows crib, constructed by Dean R. S. Shaw of the Michigan Agricultural College, for storing ear corn. This crib has given excellent service during years when ear corn was high in moisture content.

HARVESTING FOR SILAGE

It has been estimated that from 40 to 50% of Michigan's corn crop goes into the silo. In many counties of northern Michigan 90% of the corn crop is grown for silage purposes. The widespread use of the silo has carried corn growing to many counties in northern Michigan. During years of early fall frosts the presence of a great number of silos insures the safety and the proper harvest and most economical use of a

great part of the crop. The individual can secure excellent insurance against loss of feed due to early frosts by providing sufficient silo capacity. The building of more silos throughout the state tends to increase the importance and dependability of the corn crop.



24. A practical and Economical Type of Corn Crib.

Storage cribs should be built with properly spaced siding and sufficiently narrow to provide proper ventilation. If the corn is exceedingly high in moisture, ventilators should be constructed with board strips on two-by-fours, or wire mesh partitions down center of crib.

Photograph taken on farm of Dean R. S. Shaw, East Lansing. This crib is 8 ft x 16 ft and 8 ft high at post. It was built in 1919 at a cost for material of \$60.93. The capacity 700 to 800 bushels.

The best time to cut corn for ensilage is when the crop has practically matured but retains enough moisture to make succulent silage. At this stage the kernels are dented and glazed, and the lower leaves of the plant are brown. Almost two-thirds of the food value of the mature corn plant is in the ear, hence it is desirable that a good ear development, as well as a vigorous growth of stalk, be produced.

NO. 4. YIELD OF DIGESTIBLE MATTER IN CORN

Constituent.	Yield per acre.		
	Ears. Pounds.	Stover. Pounds.	Total crop. Pounds.
Protein.....	244	83	327
Carbohydrates.....	2,301	1,473	3,774
Fat.....	125	22	147
Total.....	2,670	1,578	4,248

The foregoing table (No. 4) from Farmers' Bulletin No. 578, U. S. D. A., shows the yield of digestible matter in the ear and in the stalk of the corn plant.



25. From forty to fifty per cent of Michigan's corn crop goes into the silo. Varieties which reach the dented and glazed kernel stage of maturity make the best quality of ensilage.

NO. 5. CHEMICAL CHANGES DURING GROWTH OF CORN PLANT

Yield per acre.	Tasseled July 30.	Silked Aug. 9.	Milk Aug. 21.	Glazed Sept. 7.	Ripe Sept. 21.
	Pounds. 18,045	Pounds. 25,745	Pounds. 32,600	Pounds. 32,295	Pounds. 23,498
Total yield.....					
Water.....	16,426	22,666	27,957	25,093	20,542
Dry matter.....	1,619	3,078	4,643	7,202	7,915
Ash.....	138.91	201.30	232.15	302.48	364.25
Albuminoids.....	239.77	436.76	478.69	643.86	677.79
Crude fiber.....	514.19	872.93	1,261.97	1,755.85	1,794.94
Nitrogen-free extract.....	653.91	1,399.26	2,441.29	4,239.82	4,827.69
Fat.....	72.20	167.75	228.90	259.99	314.34

Table No. 5—From Farmers' Bulletin No. 578, U. S. D. A., showing the chemical changes during the growth of the corn plant. The study of this table brings out the fact that the greatest weight per acre of food material is produced when kernels are glazed or fully matured. The best silage is made when corn is cut when the kernels are glazed and dented, and while the stalk and ear carry sufficient moisture to make succulent silage.

When corn is injured by heavy frost it should immediately be put into the silo to prevent rapid drying out. When corn has lost too much water, due to over maturity, or after freezing, to make succulent silage, water in sufficient amounts should be added when the silo is filled.

The practice of snapping the ears from the corn and making silage of stover, reduces the feeding value of the silage. This method may be a convenient way to handle stover where ear corn is used to feed hogs or other stock, but it cannot be expected that silage made from stover will produce as good gains with livestock as silage made from stalks carrying the ear. Stover silage is a cheap form of roughage for carrying breeding stock or feeders over winter, but is not advised for feeding dairy stock for production or for fattening beef animals.

Good fields of silage corn will yield from 12 to 16 tons of silage material per acre.

HOGGING DOWN CORN

Hogging down, or pasturing off, corn with hogs is a practice which has gained rapidly in lower Michigan counties during the past few years of labor scarcity. It has been proven by numerous experiments that this method of harvesting corn is economical in saving labor of harvesting and of feeding, and also from the standpoint of the gain and weight of hogs being fattened. The manure produced, is left directly on the ground, thus benefiting the land and preventing a waste of fertility. Corn may be pastured in the field with sheep in the same manner.

One man can handle a larger acreage of corn and feed out more hogs under this system than by other methods. The hogs should not be allowed to cover too much ground at one time. A good practice is to fence off the part of the field to be hogged down by use of a 2 ft. woven wire fence, held by anchor posts at either side of the field and supported by occasional posts or tied with binder twine to hills of corn. Hogs should be turned in when corn is in the hard dough or almost mature stage.



26. Alfalfa paves the way for big yields of corn.

All or part of the field may be hogged down. Four to eight acres can be fenced off at a time. When the area is cleaned up, fences should be moved to include an equal area of standing corn.

Under average conditions, in corn yielding 40 bushels or 80 baskets per acre, 4 to 6 hogs can be carried per acre. Heavier yields will carry more hogs. It will take 6 to 8 weeks for four or six hogs to clean up an acre of good corn.

It is advisable to plant rape, rye, or soybeans with corn which is to be hogged down. Rape should be planted at the rate of two pounds per acre of Dwarf Essex Rape at the last cultivation and rye at the rate of one bushel per acre at the last cultivation. A mixture of the rape and rye is often more effective for late fall pasture than either seeded alone. Rye and vetch, at rates of 1 bushel of rye to 20 pounds of hairy vetch, is another excellent seeding to be made with corn at the last cultivation.

Six or eight pounds of soy beans, drilled in with planter attachment or immediately after corn is planted, furnish additional forage for hogs.

Rye can be grown separately to furnish an early grain for hogging off.

Professor G. A. Brown of the Department of Animal Husbandry suggests that a protein supplementary ration be fed in cases where rape, rye or soy beans fail. In addition to the corn being hogged off, he suggests the feeding of skim milk or tankage.

CORN IN ROTATION

The corn crop is well suited to Michigan's cropping systems in all sections where it is adapted. Corn is an excellent crop to grow after meadow or pasture crops. The plant has been described as a "rough feeder," owing to the fact that it can apparently make the best use of organic matter, such as sod and manure which has not yet become thoroughly incorporated with the soil. It is a crop which requires thorough cultivation; hence, offers excellent opportunity for the control of weeds and grass after a sod. Preparation of the land for corn, and the cultivation given the crop, leave the ground in excellent condition for a following crop of small grain.

Growing corn in rotation aids in maintaining fertility and prevents extreme loss from insect pests or diseases. Corn smut does most damage where corn follows corn for a number of years. Growing corn in rotation with other crops is the only effective means of keeping this disease in control. Occasionally considerable damage is done to corn, when planted after an old sod, by the grubs or larvae of the June Beetle. Early plowing and thorough working will minimize such loss. Fall plowing is particularly effective. A newly turned meadow or pasture sod will pave the way for a large corn crop.

The usual rotations including corn are the following:

1. Three year rotation: the first year, clover or meadow; second year, corn; third year, small grains seeded to clover.
2. Four year rotation: first year clover; second year, corn; third year, oats, and fourth year, wheat seeded to clover.
3. Four year rotation including beans, and beets: first year, clover; second year, corn, beans or beets; third year beans, beets or corn; and fourth year oats seeded.
4. Five year rotation including timothy, and clover meadow: first

year, clover and timothy meadow; second year, corn; third year, oats seeded to clover and timothy; fourth year, clover and timothy; fifth year, timothy and clover.

5. Six year rotation including beans or beets: first year, clover; second year, corn, beets or beans; third year, oats; fourth year, clover; fifth year, beans, beets or corn, and sixth year, wheat seeded with clover.

6. Alfalfa 3 to 5 years, corn, corn, barley or oats seeded.

Rotation 1, 2, and 3 are most frequent in southern and central Michigan.

In bean and beet regions 4 and 5 are often followed. Rotation No. 5 is particularly effective in the up-keep of organic matter since a clover crop occurs every third year.

An alfalfa sod furnishes excellent condition for corn, and owing to the success with which this crop is being seeded, the more general use of rotations including alfalfa is highly desired.

CORN SMUT

In view of the prevalence of corn smut and the importance of controlling this disease, the following discussion has been prepared by Dr. G. H. Coons, Plant Pathologist of the Michigan Experiment Station:

Is Best Controlled by Rotation

Every year at harvest time, inquiries come as to the cause and control of corn smut. This is a fungous disease related to, but entirely distinct from the smut diseases known for other crop plants,—wheat, oats, and barley. The smut affects the corn at almost any growing part, the stem, the leaf, the ear, the husk, the silk or the tassel, producing a swelling which is at first white then greenish black. The attack of corn smut may come at any time of the season when corn is growing, the newly formed tender parts being most subject to it.

Typically the corn smut fungus lives over winter in the old stalks in the field. These live, infectious spores in the spring are blown by the wind to the young corn. A close examination of corn about a foot high will reveal a plant here and there with whitish over-growths,—the so-called smut boils. Only a few of these are formed, but they mature their spores and furnish the source of the later infections. Over and over again the story is repeated until the corn shows in the fall a liberal amount of this wasting disease.

The control measures for corn smut depend upon the nature of the smut's life history. Since infection takes place throughout the season, this disease cannot be prevented as is oat smut or wheat stinking smut, by seed treatment. In short, any recommendation to dip seed for control of corn smut is unwarranted.

Since the source of smut in early summer is largely the old smutted stalks of last year's crop, the planting of corn to follow corn augments most seriously the amount of smut infection. Experience in Michigan with field corn has indicated that with the ordinary season rotation is

enough to prevent excessive loss from smut, but occasional occurrence arising from spores blown from near-by fields must be expected.

With a crop grown intensively, such as sweet corn or special lots of seed corn, roguing of smutted plants early in the season is certainly to be advised. This with rotation will prevent loss. With corn as a field crop the pulling and destroying by fire of any smutted or deformed plants seen during cultivation is advisable. It is not known whether it will be practical to attempt to further eradicate the early infections by field inspections, etc. Whatever is done, harvest must come early in the season before the smut growth gets powdery.

Farmers, therefore, must not rely on seed treatment for corn. Instead they must see in rotation of crops their best ally in the battle with a wasting plant disease. The hope of the future lies in the securing of smut resistant sorts, but as yet none of these are known or tested for Michigan conditions.



27. Growing corn in a proper rotation is the most effective means of controlling corn smut.

CORN IMPROVEMENT THROUGH INTENSIFIED SELECTION

THE EAR ROW TEST AND REMNANT SYSTEM

Corn is an extremely adaptable plant in the hands of the experienced breeder. Only a few hundred years ago this crop was grown only by the American Indian. Judged by specimens preserved in burial mounds, and by varieties found in the hands of the Indians by incoming settlers, corn, as the Indians knew it, was much smaller eared and of inferior types as compared to present standards. In the hands of the white man, hundreds of varieties have been created to suit new conditions and uses.

Possibilities in corn improvement have by no means been fully realized, in spite of the great strides which have been made in corn development by careful field selection. It has long been known that individual



28. Ear row test of Duncan corn, 100 ear unit, (M. A. C. Experiment Station 1919.)

ears of corn differ markedly in their productive power; maturity, character of growth, etc., but owing to the fact that corn is open or cross pollinated under field conditions, improvement by selection is comparatively slow.

More rapid results can be secured by the ear row test and the remnant system of intensified selection. Briefly stated, this method consists in planting 50 hills or more in marked rows, properly checked, from each of 100 or more carefully selected ears, the ears being shelled lengthwise, and half of the ear reserved. The adaptation and yielding ability of the ears are found in the ear row test. The remnant ears from several of the highest yielders are planted the second year in an increase plat and multiplied for general distribution.

For the practical corn breeder who wishes more rapid results than come from simple field selection the following method is suggested:

1. Select in field at time of maturity, 5 bushels or more of ears from a variety of known worth, and store ears properly.
2. In late winter or early spring carefully select 100 or more ears of the best type and test for germination.
3. Select at least 40 ears of high germination and superior type for planting in ear row test.



29. Ears of good maturity, type, and adaptation should be selected for ear row test work. These ears are then tested for germination and shelled lengthwise, the kernels which are shelled being used in making ear row test and remnants being reserved for selection and planting of those shown best by test. Half of ear reserved.



30. Corn Selfing Plat—Michigan Agricultural College. Professor F. A. Spragg is selfing the best plants from ear-to-row breeding work in the effort to markedly improve Michigan corn varieties by this method.



31. Remnant ears from ear row test wrapped in paper and enclosed in wire screen bag in order to protect them from mice and insects until leading ears are ascertained by test and selected for second year's use.

4. Shell half the kernels from each ear lengthwise. Place in envelop, numbered to correspond with number of ear on tag, pinned to butt or tied to ear.

5. Place unshelled half of ears carefully on rack, or protect by wrapping in paper and placing in bag made of screen mesh to exclude rodents and insects until needed the next year.



32. Appearance of individual ears no sure indication of yield.

Ear No. 966 on left yield of 74.86 bushels per acre and ear No. 974 on right, 49.86 bushels per acre.

The yield in ear row test from kernels from each of these ears is shown in cuts 32 and 33. The ear row test shows the difference in yielding ability of individual ears.

6. Plant in ear row test, using seed in envelop. Select uniform soil and plant seed from each individual ear in rows 50 hills or more long, with check every 4th row planted to tested seed of the same variety.

7. Mark each row with stake with number to correspond with ear from which seed was taken.

8. Give thorough cultivation, noting carefully growth from seed from every half ear.

9. Harvest each row separately, weighing up stalks and ears. Careful notes should be taken of the total yield, maturity of ears and percent of marketable corn.

10. When several of the highest yielding and most desirable rows are ascertained, the remnants or half ears, placed on the shelf the year before, corresponding to the numbers picked out, are separated from the remainder of the remnants.



33. No. 966 row, highest yield. Note high per cent merchantable ears at center, and early maturing ears on left.



34. No. 974 row in Duncan Ear Row Plat 1919. Note high per cent of nubbins on right and small number of early maturing ears on left. Production of high and low yielding individual ears.

Plants from No. 966 yielded at the rate of 74.86 bushels per acre with 81% marketable ears and a large number of early maturing ears.

Plants from No. 974 yielded at the rate of 43.89 bushels per acre with only 70% of marketable ears and a small per cent of early maturing ears.

11. Plant the increase plat the second year from seed shelled off of the highest yielding ears. This increase plat would be well removed from other corn fields to prevent cross-pollination. Usually one or two quarts of seed are available from the leaders. The increase plat may be planted in a large potato or bean field, corner of grain field, or where protected by woods or barn from danger of cross-pollination from other corn.

12. Field select seed from increase plat in the fall. From four to ten bushels of selected seed corn should result. This will provide for a substantial planting of 20 acres or more the third season.

13. Selection may be intensified by picking out 20 or 30 of the best ears from the increase plat and planting in marked area for the third year's increase field. Selections for further ear-row work or increase work can then be made from this marked area.

The yield, adaptation, and type of corn can be greatly improved by this intensified method of selection.

Plant breeders are securing promising results by self-pollinating the corn plant to secure pure lines and recombining desirable strains so secured. As yet, no varieties of widespread note have been given to farmers by this method, though in the future valuable strains may be developed.

EAR ROW RESULTS SHOWING VARIATIONS Experiment Station Plat, 1919

As an example of variations in yield and maturity brought out by ear row work, the following table of data on eight of 75 ears included in M. A. C. ear row work of 1919 is offered:

Row Number.	Early matured Ears.	Market Quality.	Moisture in per cent.	Grain per cent.	Bushels per acre, 14% moisture.
Average of checks.....	2 4	71.3	342	853	49.80
9.10.....	15	*63.9	*37.1	853	*62.42
9.12.....	*28	76.9	*317	86	52.31
9.28.....	*0	71	358	871	26.65
9.32.....	12	*82	345	878	53.47
9.36.....	8	78	322	*889	42.30
9.11.....	6	75.9	342	*837	*22.52
*9.66.....	12	81	31	97	74.86
*9.74.....	3	70	321	867	46.88
*9.66.....	12	81	31	87	74.86
*9.74.....	3	70	321	867	46.88

*Row No. 9.10 shows highest yield but is too late in maturing.

*Row No. 9.12 shows consistency for early maturing with yield slightly above average of checks.

*Row No. 9.28—lateness of maturity but not high yield.

*Row No. 9.32—shows an average ear in market quality.

*Row No. 9.36 shows high selling percent but not high yielding ability.

Row No. 9.11 shows low shelling percent and low yielding ability, but not necessarily very early.

*Row No. 9.66 shows highest yield in plat and uniform excellence in other desirable characters. Note plate.

*Row No. 9.74 shows low yield lack of early maturity high percent of nubbins compared with No. 66. Note plate.



35. Individual rows in ear row test plat shocked for harvest—(M. A. C. Exp. Sta. 1919). This method is being employed in improving the Duncan, Golden Glow and Early Silver King and other varieties. Selected strains are distributed through the Crop Improvement Association.

CORN EXHIBITS

Corn exhibits have played a valuable part in the development and spread of corn varieties. These occasions bring together representative varieties, and the proper placing of prizes calls attention to those which are best adapted and best suited for seed purposes. Corn growers are given the opportunity of an interchange of ideas, and the attention of the general public is directed toward the importance of the corn crop. Interest on the part of the corn grower is stimulated in the inspirational atmosphere of a successful corn exhibit.

These exhibits are usually held by Farm Bureaus, Farmers' Clubs, Boys and Girls Clubs, and at county and state fairs.

For those not familiar with the methods of conducting a corn exhibit the following classification and list of premiums is presented:

CLASSIFICATION OF CORN EXHIBIT AND LIST OF PREMIUMS

Note: The premiums suggested are larger than are usually offered. It is suggested that such amounts as are available be awarded in proportions indicated.

Class 1. 10 ears Yellow Dent—first, \$5.00; second, \$3.00; third, \$2.00; fourth, \$1.00. Award of merit to next six entries, ribbon or card.

Class 2. 10 ears of White Dent—same awards.

Class 3. 10 ears of White Cap—same awards.

Class 4. 10 ears of any other Dent corn—1st, \$4.00; 2nd, \$3.00; 3rd, \$2.00, 4th, \$1.00.

Class 5. Any special prizes which may be awarded for best 10 ears.

Class 6. 100 ears of any variety of corn—first, \$10.00; second, \$7.50; third, \$5.00; fourth, \$2.50. Award of merit for the next six.

Class 7. 10 ears of Flint Corn—first, \$4.00; second, \$3.00; third, \$2.00; fourth, \$1.00.

Class 8. 10 ears of pop corn (rice)—same awards.

Class 9. 10 ears of pop corn (pearl)—same awards.

Class 10. 10 ears of sweet corn (table)—same awards.

Class 11. 10 ears of sweet corn (canning)—same awards.

Class 12. Sweepstakes. Best 10 ears of Dent corn.

(Leading Variety of County).

Class 13. Best single ear of (Standard) Variety—first, \$5.00; second, \$4.00; third, \$3.00; fourth, \$2.00.



36. A good corn exhibit calls attention to best adapted varieties and stimulates and inspires interest in corn production.

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Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
 South Haven, Van Buren County, 10 acres rented; 5 acres deeded.
 Graham Station, Kent County, 50 acres donated.

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CHARTER

LARGER YIELDS FROM CORN

- 1.—Grow adapted high yielding varieties. (Pages 4 to 18).
- 2.—Select seed corn in field before harvest and store properly. (Pages 19 to 23).
- 3.—Test germination of seed. (Pages 24 to 26).
- 4.—Plow deep in fall and early spring and fit seed bed thoroughly. (Pages 26 to 28).
- 5.—Fertilize with manure, acid phosphate, and lime. (Pages 28 to 30).
- 6.—Cultivate frequently at shallow depth to control weed growth. (Pages 31 to 32).
- 7.—Harvest for silage when kernels are dented and glazed. (Pages 32 to 35).
- 8.—Store grain in narrow, well ventilated cribs. (Page 33).
- 9.—Grow corn after sod in rotation. (Pages 36 to 37).
- 10.—Improved strains developed by intensified selection methods should be widely grown. (Pages 39 to 45).

MICHIGAN AGRICULTURAL COLLEGE

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Crop production depends primarily upon the fertility of the soil. Proper fertilization of this loam soil is essential for profitable yields of wheat.

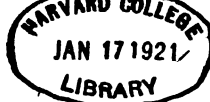
SOIL FERTILITY

BY

M. M. McCool, C. E. Millar, G. M. Grantham

EAST LANSING, MICHIGAN

1920



The Station

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SOME FACTORS IN SOIL FERTILITY.

INTRODUCTION.

Agriculture is a permanent industry and must exist as long as human society. Indeed it is the most important supporter of other industries and education. The betterment of agriculture is the foundation, the basis of all general prosperity. The fertility of the soil is the greatest of the natural resources.

Plants require food for their existence and growth and if the soil does not contain the required food elements or are infertile, life and growth are impossible. Better tillage and improved varieties of seed can not materially increase the production of infertile or depleted soils. In fact no factor of crop production under the control of man, influences the yield of crops to such an extent as the fertility of the soil.

Under adverse climatic conditions the crops on an infertile soil may fail completely while those on a fertile soil may yield fair returns. Thus in a season of drought the plants on fertile soil make a more economical use of the soil moisture and yield better than those on poor or infertile soils. Fertility also acts as a protective agent against many diseases of plants and it is very probable that a decrease in fertility accounts in no small degree for the common occurrence of some plant diseases and insect pests. This may be illustrated by the Hessian Fly on wheat during the season of 1920. Where phosphates were applied to the heavier soils in a number of our demonstrations according to counts made by C. W. Simpson, the injury by fly was much less. Moreover, where seeding is delayed because of this pest, the handicap may be largely overcome by the use of fertilizers.

In as much as the success and prosperity of a farmer depend largely upon the fertility of his soil it behooves every farmer and landowner to recognize and appreciate the importance of this basic factor of crop production. Thus they should direct their efforts towards the maintenance and increase of the fertility of their land.

Since the fertility of the soil is the greatest of the natural resources and is the most important supporter of all agriculture it follows that it is both desirable and obligatory on the part of national, state and county governments to do all that is practicable towards the maintenance or the increase of the fertility of the soil.

LOSS OF PLANT FOOD ELEMENTS FROM SOILS.

Virgin soils in humid regions become less fertile with age. In various sections of the United States there are large areas of rather heavy lands which were in a very low state of fertility when first settled by the white man. These areas were once very productive but due to the various climatic factors operating through long periods of time they became depleted. It is evident therefore that there are certain natural agencies which tend to impoverish the soil. When soil is brought under cultivation usually these natural agencies are stimulated to a certain extent and new ones are also added. The most important of these are leaching, erosion and the removal by crops.

THE LIME PROBLEM IS GENERAL.

The amount of lime removed by leaching is greater than the amount of other substances lost in a similar manner. Tests conducted by farmers, county agents and members of the Soils Section show clearly that many of our lands have reached the stage where liming is advisable for satisfactory crop production, especially if one desires to grow the clovers, alfalfa and vetch. There are reasons for this condition. Lime is constantly removed from soils by leaching or washing by rain water that falls on them and by the crops that are harvested. The loss of lime from the soil is exemplified by the conditions that exist in many places in Michigan. When the better classes of our soils were left by the glacier they contained about the same amount of carbonate of lime from the surface downward. Of course the different kinds of soil varied from one to the other. Our soil surveys show that carbonates do not exist even in the fine textured soils over much of the State above thirty-six inches, although in some types it lies within eighteen inches of the surface, whereas in sandy soils it has been removed to depths ranging from four to ten or more feet. The marl beds bear witness of this removal from the upland soils and owe their existence to it. This means that sooner or later all soils will become deficient in this substance and must receive it in some form if they are to continue to be productive. Our investigations also show that not all of our soils are deficient in lime or respond to its application. It may be cited for example that the finer textured soils of the Old Lake Bed of eastern Michigan, the Thumb area and the Saginaw Basin are not in need of it. Aside from these and portions of the soils in Alpena, Presque Isle, Cheboygan, Emmet, Charlevoix, Antrim, Otsego, Grand Traverse and Leelanaw counties, the majority of the soils in the southern Peninsula are deficient in this element.

When it is considered that lime is necessary for soil productivity and that it is lost by leaching or washing and by removal of crops from the land the conclusion is logical that the use of it in some form is one of the necessary practices involved in permanent systems of agriculture.

THE NITROGEN PROBLEM IS ACUTE IN SOME SECTIONS.

Nitrogen is necessary for plant growth. The maintenance of ample amounts of active vegetable matter or humus in the soil to supply nitrogen to crops and to keep the soil in good condition constitutes our greatest soil problem. Therefore the nitrogen and humus problem needs special consideration.

Nitrogen is found in all plants, soil organic matter or humus as well as in several commercial forms. When present in or added to the soil in suitable compounds it results in an intensity of the green coloring matter, and increases the root, stem and leaf development or the vegetative portions of the common plants. On the other hand it is well-known that the presence of an excess of available nitrogen may prevent proper seed formation and cause lodging of grains and grasses, especially if the phosphorus and potassium are somewhat deficient. The amount at the disposal of the crop affects greatly its quality in as much as large amounts result in the formation of soft tissue. Therefore, one may regulate somewhat the quality of such crops as cabbage, celery, lettuce, asparagus and others by controlling the nitrogen relationships. It is well to mention that excessive amounts prolong the growing period or delay maturity.

Nitrogen starvation is indicated by yellowish or pale-green colored leaves, lack of thriftiness or a general stunted appearance. It should be recalled that other soil conditions may result in similar symptoms.

Sources of Nitrogen. There are four chief sources of nitrogen for crops, namely from vegetable matter or humus, from bacteria in legumes, from bacteria and other forms in the soil and from commercial fertilizers. The chief source for most crops is the soil vegetable matter, commonly spoken of as humus.

Nitrogen from vegetable matter is important. Before this nitrogen is made use of or taken from the soil by the crops the process of decay or rotting and nitrification or the formation of nitrates must take place. Decay may be and usually is brought about by several kinds of organisms or germs which infest the soil. These processes or the making available the nitrogen of the humus may be slow under some conditions and rapid under others.

When the soil is cool or the temperature is low and it is wet, decay and consequently the rendering of the nitrogen available for crops is very slow. On the other hand when the soil is warm and moist, but not soaked with water, these processes are much more rapid. If lime is deficient in the soil its addition results in hastening decay. It has also been shown that phosphorus acts similarly and it is probable that the splendid effects of acid phosphate, late in the autumn and early in the spring, are due in part to this action.

The kind of material that is added to or is present in the soil governs the rate of formation of available nitrogen. It is well recognized that clovers, alfalfa, beans, peas and vetch decay more rapidly in the soil than do straws of the cereals. The breaking down of the latter may proceed very slowly if lime is deficient in the soil.

The rate of decay and consequently the formation of nitrates in the soil is most rapid near the surface. This may be illustrated by the conditions of fence posts that have been in the soil a number of years.

They usually rot off or are broken off at or near the surface of the ground, yet decay takes place at greater depths but to a much less extent depending upon the nature of the soil, that is, whether heavy or light as well as the water content. This is shown in Fig. 1, after Fippin. Decay takes place more rapidly in soils that are devoted to row or tilled crops than it does in those devoted to others. These processes proceed rapidly in fallow land or land not occupied by crops that is stirred frequently.

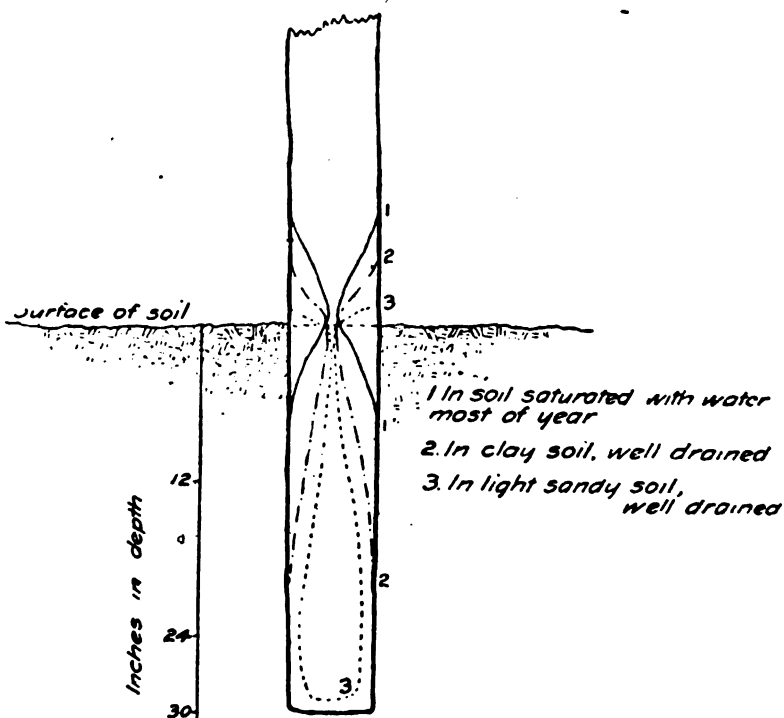


FIGURE 1.—The rate of decay of manure and crop residues is controlled by soil texture, moisture content and the depth of covering.

Decay should not be too rapid. If these processes take place too rapidly great losses of nitrogen may take place. This is true because nitrates are readily soluble in or are dissolved by water and thus if not utilized by growing plants they may be washed out of the soil and pass away in the drainage water. We have found for example that they move about quite readily with the soil moisture. Dr. T. L. Lyon of the New York Agricultural College at Cornell University found that heavy land unoccupied by a crop lost 444.8 pounds of nitrogen per acre by leaching, whereas the losses from the same soil when cropped were 25.6 pounds per acre per year.

We may say therefore that the presence of vegetable matter in the soil is essential to successful crop production because it is from this that plants obtain much of their nitrogen supply. Moreover there are other decidedly beneficial effects such as the improvement of soil tilth,

the making available of phosphorus, potassium and other elements of plant-food as well as the favorable effects it has on lower organisms, germs or bacteria that are beneficial. This material must decay in the soil, consequently if a proper supply is maintained provision must be made for regularly renewing it. This is another condition essential to soil fertility.

Nitrogen may be taken from the air by legumes. The soil does not furnish all of the nitrogen that some crops contain. The legumes or those plants that form seed in pods such as the clovers, alfalfa, peas, beans, cowpeas and vetch may obtain nitrogen from the soil air by means of germs or bacteria that are present in the soil or added to it. These attack the tender portions of the roots and cause galls, tubercles



FIGURE 2.—It is much better to have straw rot in the soil than in the pile or stack or to be burned.

or nodules to form. In these are large numbers of germs or bacteria which are able to take the nitrogen from the soil air and pass it on to the plant in such form that it makes use of it in its growth. In the light of our present knowledge we may say that such crops derive about two-thirds of their nitrogen from the soil air and one-third from the soil. This relationship is shown by figures 3 and 4.

Nitrogen may be fixed in the soil by other organisms. Some germs or organisms take nitrogen from the soil air and fix it or place it directly in the soil in such condition that it may be utilized by crops. This may proceed in the absence of growing crops. It is agreed that the activity of these varies greatly in different soils and they are encouraged by many conditions that are favorable to the common crops such as heat, moisture, lime, phosphorus, vegetable matter, good tilth and others.

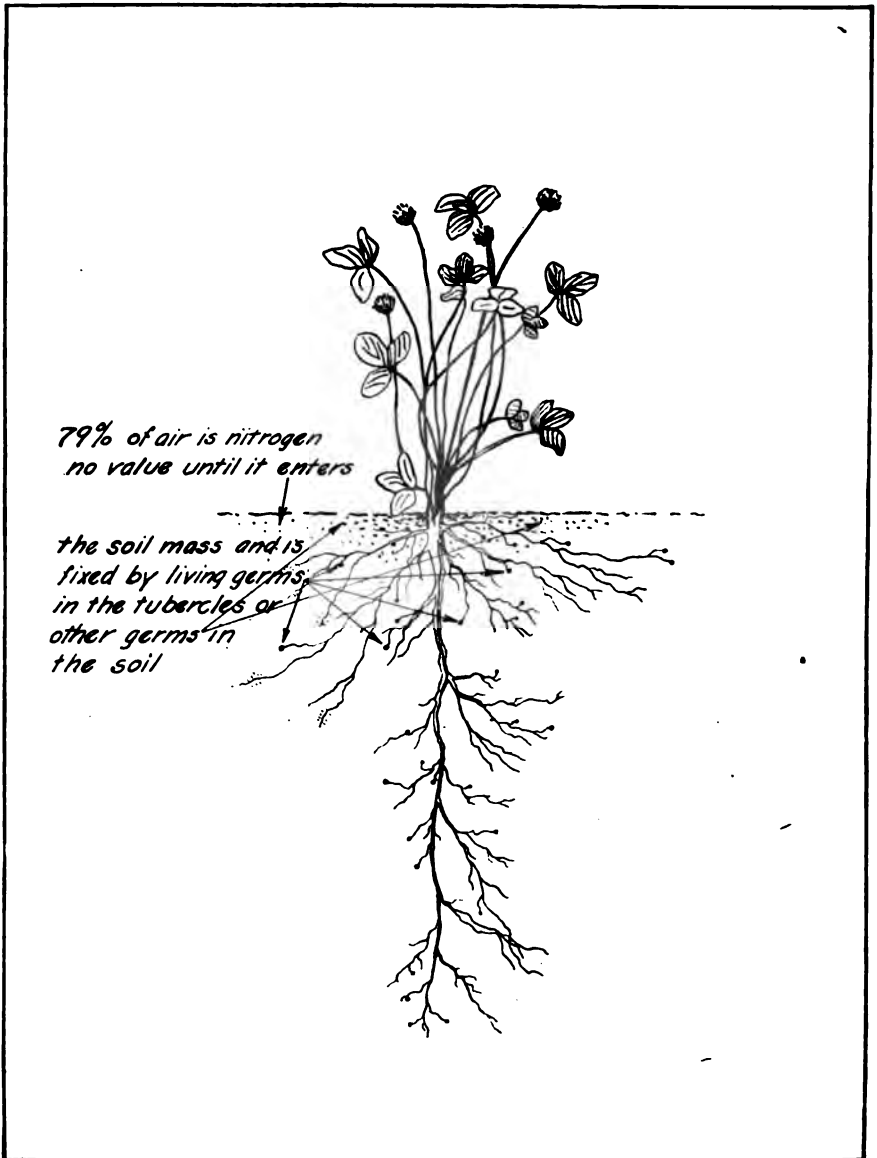


FIGURE 3.—The cheapest source of nitrogen is the air. More legumes should be grown in Michigan.

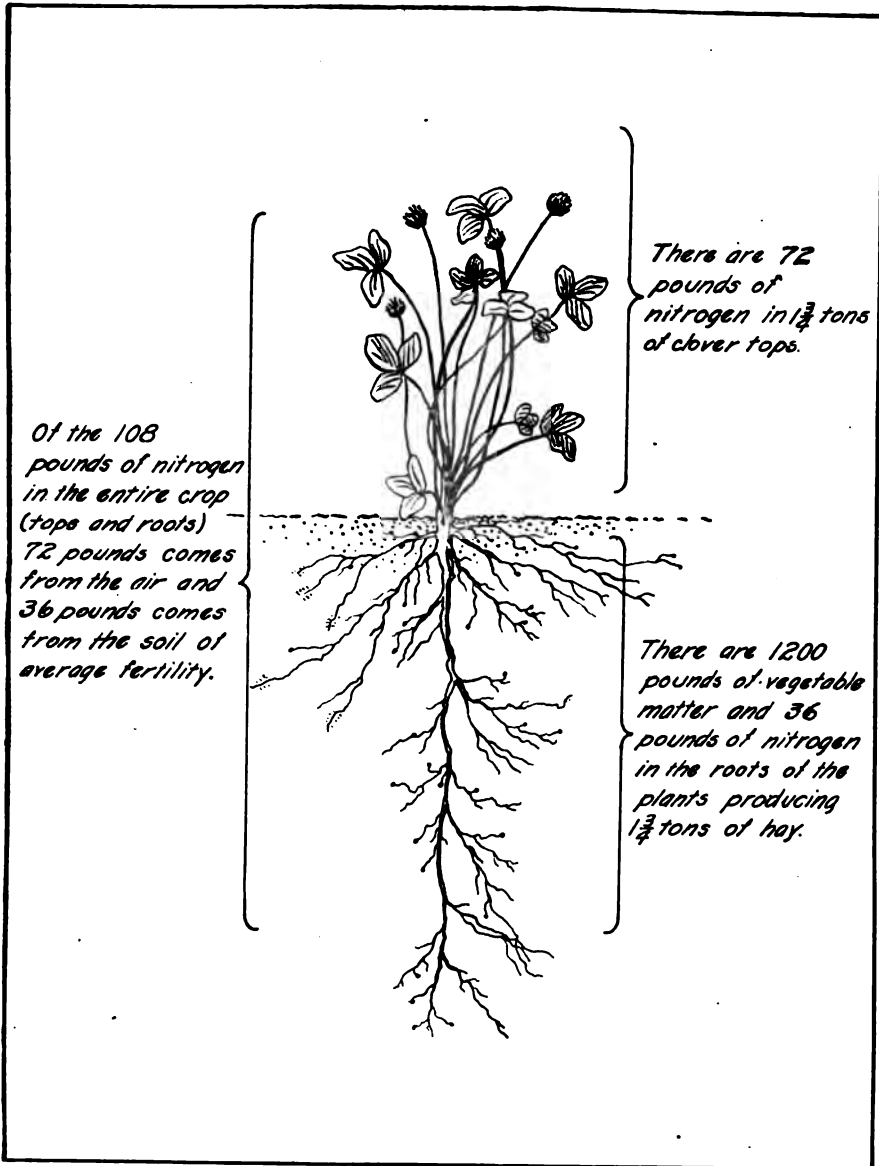


FIGURE 4.—The supply of nitrogen in the soil is not increased by growing clover if all the hay is removed.

THE POTASH SITUATION DESERVES CONSIDERATION.

Potash is leached from the soil in relatively small amounts. Analyses of river, well and drainage waters taken from several parts of the humid areas of the world show that this is not important in the maintenance of soil fertility. When this element of plant-food is applied to the soil it is held quite firmly until removed by growing plants. Very porous sands may be exceptional however. On the other hand potash that is present in hay, straw or manure is quite easily washed out when exposed to the elements and may be lost so far as crop production is concerned.

Potash is contained in relatively large amounts in unleached manure, one ton on the average carrying 10.5 pounds. This constitutes the chief carrier of potash used on Michigan soils. Potash can be purchased on the market in several carriers.



FIGURE 5.—Gullying in fields makes portions of them inaccessible, unproductive and buries good land that lies at lower levels.

THE LOSSES OF PHOSPHORIC ACID BY LEACHING ARE SMALL.

The amount of phosphoric acid removed from soils by drainage water is less than that of potash. Investigations conducted in England and at several experiment stations in this country show that phosphoric acid that is present in or added to soils is held tenaciously by them. Moreover it is not removed from manure or crop residues as is potash.

Manure contains less phosphoric acid than potash, a ton carrying under average conditions about 6 pounds. The chief sources of supply are the commercial carriers.

Most soils of the State respond to applications of phosphate fertilizers. For further information relative to this important plant-food refer to

the Michigan Experiment Station regular bulletin 284—"Some Information and Suggestions Concerning the Use of Phosphorus."

SOIL EROSION SHOULD BE CHECKED.

The removal of the surface soil by water erosion or washing is serious in many fields. The gulying in fields attracts some comment and results in considerable inconvenience in certain localities but on the whole this is of minor importance in comparison with sheet erosion or the displacement of the surface layer of soil without the formation of gullies. The fertility of small valleys and depressions and the low productivity of knolls and ridges in undulating and rolling land bear evidence of the washing from the upland of the richer surface soil. Moreover soluble plant-food constituents accumulate to a variable extent on the surface of these heavier soils as they become dry, more so when either bare of vegetation or devoted to tilled crops than if occupied by grasses or small grains. When torrential or dashing rains follow such conditions appreciable quantities of these are removed by the water that runs off the surface.

These amounts do not seem large and yet when it is recalled that they must be procured from the available supply of the soil they assume a



FIGURE 6.—Sheet erosion accounts for the low productivity of many rolling or hilly lands because it removes the fertile surface soil.

new importance. A large number of samples have been taken from the predominating soils types in Michigan and subjected to analyses. The samples were placed in two groups: cropped and uncropped. The former were taken from fields which have been under cultivation for a long period of years and the other group from line fences, woodlots and virgin timber, which have never been under cultivation. A summary of the results of many analyses is given in table 1.

TABLE 1.—Pounds of nitrogen, phosphoric acid and humus in cultivated and uncultivated soils.

	Nitrogen.			Phosphoric acid.			Humus.		
	Virgin.	Cropped.	Per cent difference.	Virgin.	Cropped.	Per cent difference.	Virgin.	Cropped.	Per cent difference.
Level to undulating loamy sands and sandy loam of S. W. Michigan—original timber largely oak.....	3,032	1,993	34.27	2,471	2,086	15.57	63,672	41,853	34.27
Level to undulating loams of S. W. Michigan—original timber oak, maple, beech, some hickory.....	4,562	3,355	24.46	3,154	2,224	29.48	95,802	70,455	24.46

The decreased fertility shown in this table is supported by observations of the older settlers, who in many communities tell us of the large wheat yields and luxuriant stands of clover of earlier years.



FIGURE 7.—During one generation the fertility of some fields has been materially reduced. On the right wheat growing on 70-year old field, on the left line fence.

FERTILITY REMOVED BY CROPPING.

Since unquestionably there has been a decrease in the fertility of most of our soils it is well to study some of the farming systems followed

in the State to learn if possible where the difficulty lies. This is especially desirable since on most farms considerable quantities of manure, clover sod and other organic materials are plowed under. We have worked out in detail the conditions that may exist under several systems of farming.

Conditions on a grain farm. Some farmers follow a system of grain farming. The maximum or greatest, the minimum or lowest and the average losses of certain plant-food constituents are summarized in table 2.

TABLE 2.—Plant food balance on a 100 acre grain farm carrying 2 cows, 5 horses and 14 hogs.

	Nitrogen— pounds.	Phosphoric acid—	Potash— pounds
Plant food in feed and pasture grass.....	1,630.78	504.04	1,263.43
Loss during digestion and handling of ma- nure.....	Maximum... 938.60 Minimum... 739.42 Average... 839.01	271.48 190.51 230.99	558.96 450.51 504.73
Returned to soil in bedding; stover, etc.....	684.4	185.84	1,014.90
Total returned to soil.....	Maximum... 1,575.76 Minimum... 1,376.58 Average... 1,476.17	499.37 418.40 458.89	1,827.81 1,719.36 1,773.59
Removed from soil in crops.....	4,945.5	1,927.53	4,325.13
Annual loss from soil.....	Maximum... 3,568.92 Minimum... 3,369.74 Average... 3,469.33	1,509.10 1,428.16 1,468.64	2,605.77 2,497.32 2,551.52

It is seen that under the conditions given a considerable annual loss of nitrogen, phosphoric acid and potash is sustained on this farm. This is true irrespective of the fact that all stover not fed is plowed under and assuming that there is no loss of plant food from straw used for bedding, a condition which is not true. If all the straw not used on the farm were plowed under instead of being sold, there would still be a net average loss of 2,609.73 pounds of nitrogen, 1,220.24 pounds of phosphoric acid and 1,423.82 pounds of potash.

Conditions on a general farm. In some instances general farming is practiced. The fertility situation as nearly as can be determined is as given in table 3.

TABLE 3.—Plant food balance on a 100 acre general farm, carrying 6 cows, 4 young cattle, 5 horses and 14 hogs.

	Nitrogen— pounds.	Phosphoric acid— pounds.	Potash— pounds.
Plant food in feed and pasture grass.....	2,645.79	830.71	2,059.79
Loss during digestion and handling of ma- nure.....	Maximum... 1,546.25 Minimum... 1,067.40 Average... 1,306.82	459.76 304.68 382.22	902.89 679.12 791.00
Returned to soil bedding; stover, etc.....	550.4	145.22	845.83
Total returned to soil.....	Maximum... 2,128.79 Minimum... 1,649.94 Average... 1,889.36	671.25 516.17 593.71	2,226.50 2,002.73 2,114.62
Removed from soil in crops.....	4,937.45	1,900.17	4,434.16
Annual loss from soil.....	Maximum... 3,287.51 Minimum... 2,808.66 Average... 3,048.09	1,384.00 1,228.92 1,306.46	2,431.43 2,207.66 2,319.54

*A detailed statement of the conditions on the farm is given in the appendix.

The losses of plant-food elements from the 100-acre general farm are somewhat less than from the grain farm of similar size but they are still menacingly large. The keeping of enough livestock to consume a considerable portion of the farm produce has reduced the annual loss of fertility but not so much as is generally believed.

The clover hay has taken its nitrogen from the air rather than from the soil. The amount of nitrogen so removed, however, is equal to the nitrogen contained in the tops or hay, that in the roots being drawn from the soil. It is evident, therefore, that the mere growing of clover does not increase the supply of nitrogen in the soil unless the clover is returned directly or as manure. If the clover is fed to dairy stock a considerable percentage of the nitrogen it contains is retained by the animal. The clover also draws its supply of mineral elements from the soil and hence there is a direct loss of these materials.

In general a larger crop follows the plowing under of a clover sod even when all the hay has been removed. This is due to the fact that the roots, stubble and fallen leaves of clover decomposes rapidly releasing their supply of plant-food elements. This decomposition may force the soil particles to release a portion of their elements in an available form. The result is then available plant-food rather than an increased supply in the soil.

Conditions on a dairy farm. Dairy farming is widely practiced in Michigan. The plant-food condition on a farm carrying sufficient stock to consume practically all the feed crops which can be grown and still maintain a fairly well balanced farming system in addition to purchased concentrates will be studied here.

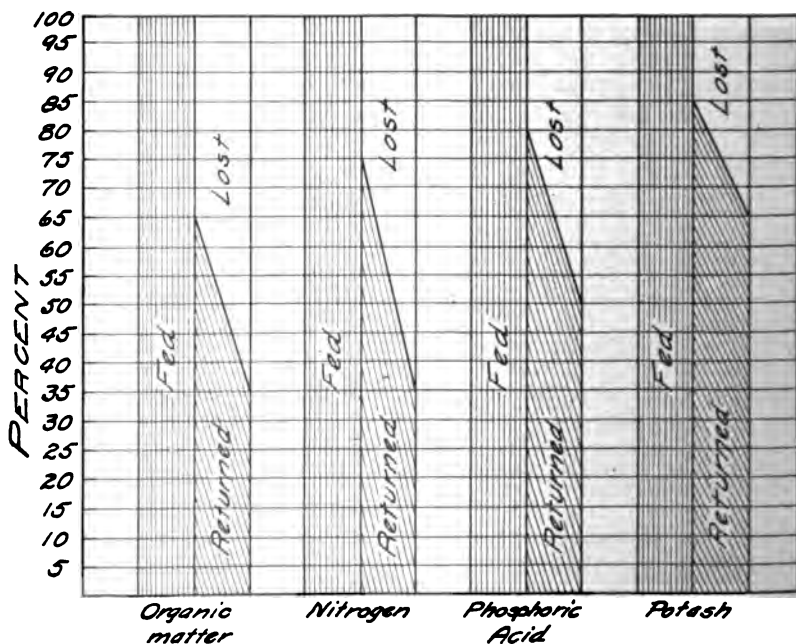


FIGURE 8.—Much organic matter is destroyed and considerable quantities of nitrogen, phosphoric acid and potash are retained by dairy cows.

TABLE 4.—Plant food balance on a 100-acre dairy farm, carrying 20 cows, 10 young cattle, 5 horses and 20 hogs.

	Nitrogen— pounds.	Phosphoric acid— pounds.	Potash— pounds.
Plant food in feed consumed and pasture grass	4,858.4	1,851.72	3,934.19
Losses during digestion and handling of manure.....	Maximum..... 2,908.07	1,028.67	1,667.56
	Minimum..... 1,657.67	514.30	1,129.55
	Average..... 2,282.87	771.48	1,398.55
Returned to soil in bedding, stover, etc.....	522.0	145.73	866.80
	Maximum..... 3,722.73	1,483.15	3,671.44
Total returned to soil.....	Minimum..... 2,472.33	968.78	3,133.43
	Average..... 3,097.53	1,225.97	3,402.44
Removed from soil in crops.....	5,266.9	1,933.19	5,218.74
	Maximum..... 2,794.57	964.41	2,085.31
Annual loss from soil.....	Minimum..... 1,544.17	450.04	1,547.30
	Average..... 2,169.37	707.22	1,816.30

The question arises at this point, "Why is it that on livestock farms good yields are still obtained, while where little or no stock is kept the soil depletion is much more evident?" We must remember that most of the plant-food elements in manure are readily available or soon become so. Therefore when manure is applied a quantity of very effective material is added which though it does not equal in amount the material removed from the soil in crops, is very quick to show results. The manure during decay may make available some mineral elements of plant-food. Moreover the soils have been changed more frequently than where grain farming has been followed.

The maximum and minimum and average losses of the plant-food elements are given above. It must be borne in mind that the amount of these nutrients retained by dairy cows varies greatly, those animals giving a large flow of milk naturally retaining more than the less productive individuals. The care with which manure is handled varies greatly. With low producing animals and the best of care the losses may run below the minimum set and on the other hand a combination of higher producing cows and careless handling of manure may result in a greater loss than is indicated by the maximum.

It will be noted in the detailed statements of the operations on these farms, which appear in the appendix that only 10 acres of good clover hay are grown. This represents the condition as it exists on a majority of the farms today but is far from the condition desired and from the farm practices that prevailed in the earlier history of the State. It seems advisable therefore to include a summary of plant-food conditions on a 100-acre general farm growing twenty-five acres of clover. This should permit clover to be grown on every acre once in every four years. The balance on a 100-acre sandy farm using a short rotation including twenty-five acres of clover and five acres of soy beans is also included (tables 5 and 6).

A comparison of the data from the general farms growing small and large acreages of clover respectively shows that the larger acreage of legumes has decreased the loss of nitrogen but has increased the drain on the phosphorus and potassium. This is what would be expected since a large proportion of the hay was sold. However, only three more tons of hay were sold from the general farm than from the dairy farm carrying 20 cows but feeding silage. If the second cutting were turned under

or the straw returned after threshing the loss would be diminished by approximately 750 pounds of nitrogen, 82 pounds of phosphorus and 560 pounds of potassium.

On the sandy farm the losses are not so heavy because the crops produced are not so large.

TABLE 5.—Plant food balance on a 100-acre general farm, growing 25 acres of clover, and carrying 6 cows, 4 young cattle, 5 horses and 14 hogs.

	Nitrogen— pounds.	Phosphoric acid— pounds.	Potash— pounds.
Plant food in feed consumed and pasture grass.....	2,641.61	829.22	2,053.24
Loss during digestion and handling of manure.....	Maximum..... 1,544.44	468.25	905.33
	Minimum..... 1,065.18	303.61	676.12
	Average..... 1,304.81	385.93	790.73
Returned to soil in bedding, stover, etc.....	268.22	70.71	440.64
Total returned to soil.....	Maximum..... 1,844.65	595.29	1,817.75
	Minimum..... 1,365.39	431.65	1,588.55
	Average..... 1,605.02	512.97	1,703.15
Removed from soil in crops.....	3,998.73	1,901.63	4,790.26
Annual loss from soil.....	Maximum..... 2,633.34	1,469.98	3,201.71
	Minimum..... 2,154.08	1,306.34	2,972.51
	Average..... 2,393.71	1,388.66	3,087.11

TABLE 6.—Plant food balance on a 100-acre general farm on sandy soil with a short rotation, including 25 acres of clover, and carrying 6 cows, 4 young cattle, 5 horses and 14 hogs.

	Nitrogen— pounds.	Phosphoric acid— pounds.	Potash— pounds.
Plant food in feed consumed and pasture grass.....	2,701.97	828.08	2,062.34
Loss during digestion and handling of manure.....	Maximum..... 1,583.98	458.25	1,015.33
	Minimum..... 1,097.13	303.56	669.40
	Average..... 1,340.54	379.53	803.04
Returned to soil in bedding, stover, etc.....	170.00	78.00	211.00
Total returned to soil.....	Maximum..... 1,774.84	602.52	1,623.94
	Minimum..... 1,287.99	447.80	1,278.06
	Average..... 1,531.43	526.55	1,490.30
Removed from soil in crops.....	2,949.27	1,468.88	3,625.90
Annual loss from soil.....	Maximum..... 1,661.28	1,021.08	2,347.84
	Minimum..... 1,174.43	866.36	2,001.96
	Average..... 1,417.84	942.33	2,135.40

It is impossible to state the actual loss of nitrogen per year on any farm, because there are several variables such as the fixation of nitrogen and the losses due to leaching, erosion, etc. The fact that some soils are growing lighter in color, however, is evidence that a considerable loss of nitrogen is sustained. This is borne out by the results of field experiments quoted later in this publication which show a decided and profitable increase in the yield of wheat on the sandier soils as a result of the use of commercial nitrogen.

A consideration of these farming systems leads to the inevitable conclusion that the fertility of the soil can not be maintained without the supplying of plant-food elements from some exterior source. The source at present available is commercial fertilizers.

THE USE OF FERTILIZERS.

Most farm practices reduce to a greater or less extent soil fertility. In fact it is common knowledge that fertile, virgin soils produce an

abundance of crops without the application of any form of fertilizing materials but later they become less productive and the farmer makes use of farm manure and other materials produced on the farm in order to overcome this condition. Still later materials must be purchased from outside sources if the farm is to continue in its productivity. It is now considered that many new soils also will profitably respond to applications of lime or other materials.

The chief object in view when fertilizers are used is to increase the yield of crops at a maximum profit or in other words to increase the labor income on the farm and it should also be the aim to maintain the fertility of the soil at the same time. There are less acres of land, horse and man hours required to raise a given amount of produce on good land than on land of average fertility or less. This is exemplified by the figures in table 7.

TABLE 7.—Hours of human labor and horse labor and acres of land required to produce the same amount of crops on average land and land properly drained, limed and fertilized.

Crop.	Amount produced.	Average land.			Drained, limed and fertilized land.		
		Acres required.	Man hours.	Horse hours.	Acres required.	Man hours.	Horse hours.
Beans.....	195 bu.....	24	840	984	10	350	410
Oats.....	600 bu.....	20	252	454	9	113.4	204.3
Wheat.....	340 bu.....	22	369.6	778.8	10	168	354
Hay.....	25 tons.....	20	98	362	11	53.9	199.1
Total.....		86	1,559.6	2,578.8	40	685.3	1,167.4

This may be carried farther by showing that the returns for labor are affected by crop yields. Dr. J I. Falconer of Ohio State University recently reported results of studies made in 1918 of 67 farms in a community in Huron county, Ohio. He reported that these farms lie on the same soil type. They were divided into three groups according to their yields as shown in table 8.

TABLE 8.—Effect of crop yields on labor income.

Crop Yields.	Number of farms.	Value of per day of labor.
Poor.....	19	\$11.92
Fair.....	20	15.01
Good.....	18	18.01

The labor income is greatly affected by crop yields or the fertility relationships of the soil. It is good business practice to produce yields of crops considerably above the average of the State.

There are several principles involved in the use of commercial fertilizers that should be considered. Application of fertilizers to soils when the formation of available plant-food from vegetable and mineral matter is slow are frequently desirable. If the spring growth of fall sown grain

is backward because of a severe winter or a late spring the use of light top dressings of nitrates on some soils is a profitable and desirable practice. Where weather conditions are such that very late fall seeding is obligatory or late seeding is practiced on account of the Hessian Fly, the use of readily available fertilizers is urgent in as much as they cause a rapid growth and winter injury is less serious. Moreover where an early marketable crop is desired the use of commercial fertilizers is advisable. In addition the use of readily available fertilizers is sound in regions where the growing period is short since they tend to hasten growth and maturity. Still another point to consider is that fertilizers may increase the root development of plants and consequently their feeding range, thereby assisting them to obtain additional elements of plant-food from the soil. This probably accounts for the benefit derived from small applications. Naturally such practices do not comprise permanent systems of fertility.

The vegetable matter or humus content of soils may be increased by the use of commercial fertilizers. It has been shown that the roots and above ground portions of crops may be increased by this means if proper rotations of crops are followed. There is more material left in soils and larger quantities of residues or manure, straw, etc., to return to the land. If on the other hand the soil is improperly managed or the residues are carelessly handled, burned or not returned to the land, small amounts of available commercial fertilizers will result in more rapid depletion of humus than if they are not used.

Some soils are actually deficient in one or more elements of plant food and fertilizers are added to meet this need. As has been pointed out this is the case with many of Michigan's heavy soils with respect to phosphoric acid, and sandy soils are not only low in phosphoric acid but are also generally deficient in humus and nitrogen. Although potash is usually present in abundance in the mineral soils, we have found that its use on some sandy lands is desirable for the production of the legumes and many growers report also that it is desirable—when prices are normal—for the production of potatoes and root crops. Some muck and peat soils respond to lime, some to phosphoric acid, some to potash, and some to both phosphoric acid and potash.

We have in progress many field tests that are being conducted cooperatively by farmers, county agents and representatives of the Soils Section. It is proposed to continue these at least one round of a rotation and longer if practicable. Although it is recognized that the value of such tests increases with the length of time they are continued, it seems advisable to report the results we have obtained at this time. A summary is given in table 9 followed by a detailed report.

In calculating the returns from the application of the materials applied to the soils the following prices per bushel were used: Wheat, \$2.00; corn, \$1.25; oats, \$0.60; rye, \$1.50; soy beans, \$5.00. The following in terms of tons: Clover hay, \$22.00; straw, \$8.00; lime, \$4.50; acid phosphate, \$32.00; sodium nitrate, \$90.00; potash, \$176.00, rock phosphate, \$20.00; sulphate of ammonia, \$100.00. If the price of farm products were only one-half the amounts used and the cost of the fertilizers were the same, naturally the returns derived from their use would be less.

SOIL FERTILITY

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TABLE 9.—A summary of fertility tests.

Farm of	Location.	Treatment.	Soil.	Crops.	Return per acre.
J. Wheeting.....	Imlay City.....	Lime.....	Sand.....	Corn, oats....	\$29.95
J. Wheeting.....	Imlay City.....	Lime.....	Sand.....	Wheat.....	7.99
Cass County Farm .	Cassopolis.....	Lime.....	Sand.....	Soybeans, rye, wheat.	9.60
Bert Gilbert, Paul Schnelle, Chas. Kinser.	Emmet and Cheboygan counties.	Lime.....	Sand.....	Rye.....	-6.15
Manistee County Farm.	Manistee.....	Lime.....	Sand.....	Rye.....	-4.47
Thos. Moore.....	Thompsonville..	Lime.....	Sand.....	Rye.....	.73
Van Buren County Farm.	Hartford.....	Manure.....	Sandy loam ..	Oats, clover ..	*10.41
J. Wheeting.....	Imlay City.....	Manure.....	Sand.....	Corn, oats....	*30.05
Paul Schnelle.....	Clarion.....	Manure.....	Sand.....	Rye.....	*18.63
W. C. Kempster....	Coldwater.....	Rock phosphate.	Silt loam....	Oats, wheat ..	23.88
Van Buren County Farm.	Hartford.....	Rock phosphate, with nitrogen and potash.	Sandy loam ..	Oats, clover, 2 crops.	6.64
Van Buren County Farm.	Hartford.....	Rock phosphate, with manure.	Sandy loam ..	Oats, clover, 2 crops.	14.79
Jas. Richards.....	Eau Claire.....	Rock phosphate, with marl.	Silt loam....	Oats, wheat ..	-22.35
Cass County Farm .	Cassopolis.....	Rock phosphate, with limestone.	Sand.....	Soybeans, wheat, rye.	- .84
B. C. Gilbert, Paul Schnelle, Chas. Kinser.	Emmet and Cheboygan counties.	Rock phosphate.	Sand.....	Rye.....	-12.94
E. D. Fairchilds....	Constantine....	Rock phosphate.	Sand.....	Corn-rye....	18.78
B. C. Gilbert, Paul Schnelle, Chas. Kinser.	Emmet and Cheboygan counties.	Acid phosphate .	Sand.....	Rye.....	2.28
		Acid phosphate, sodium nitrate.	Sand.....	Rye.....	13.10
		Acid phosphate, sodium nitrate, potash.	Sand.....	Rye.....	3.49
Cass County Farm .	Cassopolis.....	Acid phosphate, lime.	Sand.....	Soybeans, rye, wheat.	.71
		Acid phosphate, sodium nitrate, lime.	Sand.....	Soybeans, rye, wheat.	11.44
		Acid phosphate, sodium nitrate, potash-lime.	Sand.....	Soybeans, rye, wheat.	22.20
Manistee County Farm.	Manistee.....	Acid phosphate .	Sand.....	Rye.....	13.83
		Acid phosphate, sodium nitrate.	Sand.....	Rye.....	12.36
		Acid phosphate, sodium nitrate, potash.	Sand.....	Rye.....	4.50

TABLE 9.—Concluded.

Farm of	Location.	Treatment.	Soil.	Crops.	Return per acre.
W. C. Kempster.....	Coldwater.....	Acid phosphate..	Silt loam.....	Oats, wheat..	26.34
		2-12-2.....	Silt loam.....	Oats, wheat..	17.63
F. McCartney.....	Morrice.....	Acid phosphate..	Silt loam.....	Wheat.....	12.35
		Acid phosphate, sodium nitrate.	Silt loam.....	Wheat.....	21.16
		Acid phosphate, sodium nitrate, potash.	Silt loam.....	Wheat.....	15.06
W. J. Guthrie.....	Mendon.....	Acid phosphate..	Silt loam.....	Wheat.....	28.42
		2-12-2.....	Silt loam.....	Wheat.....	28.39
S. Simpson.....	Vicksburg.....	Acid phosphate..	Silt loam.....	Wheat.....	16.72
24 trials.....	Commercial nitrogen (top dressing)..		Light soils...	Wheat.....	7.96
28 trials.....	Commercial nitrogen (top dressing)..		Heavy soils...	Wheat.....	-1.14

*Gross.

RESULTS FROM THE USE OF LIME.

Tests conducted on the farm of John Wheeting in Lapeer county in all cases have shown excellent results from the use of lime. The soil is a rolling sand on sandy silt sub-soil typical of large areas in that section. The land has been farmed a number of years. Lime at the rate of 2 tons per acre was applied in the spring of 1919 for corn. The increase in yield of this crop due to the lime was 19.86 bushels and 920 pounds of stover. The following year oats were seeded on the same areas. The increase in yield of oats due to the lime was 29.33 bushels and 1,280 pounds of straw. After having deducted the cost of lime a return of \$29.95 was derived from the first two crops of a four-year rotation.

On the same farm and the same soil type an application of lime on wheat land in the fall of 1919 gave an increase of 6.23 bushels of grain and 832 pounds of straw. The returns above the cost of lime amounted to \$7.99 per acre.

Lime is used profitably on the Cass county farm. Experiments to determine the value of lime were started in the spring of 1917 on the Cass county farm. The soil is a sand to sandy loam on a sub-soil of gravelly, silty nature. This land has been farmed for many years and four years previous to 1917 had been idle because it was too poor to produce profitable crops. An application of 6,300 pounds of lime per acre was made on a series of plots with corresponding plots untreated. A four-year rotation of soy beans for seed, rye, wheat and soy beans for green manure, has been followed. The average increase of the limed over the untreated plots is as follows: Soy beans, 1.14 bushels; rye, 1.70 bushels; wheat, 6.5 bushels and 632 pounds of straw; and soy beans, 1,231 pounds of green weight. After deducting the cost of the lime from the first three crops grown in the rotation there remains a balance of \$9.60 per acre. On a similar treated series sweet clover was grown as a green manure crop instead of soy beans, the last crop of a four-year rotation. The average of the lime-treated over the unlimed

plots showed an increase of 4,450 pounds of green matter, the quantity of sweet clover produced on the untreated plots being negligible.

On the above soil further work was carried on using different fineness of division of limestone and other forms of lime. A standard application of 4,000 pounds of the carbonate forms, limestone and marl, and an equivalent amount of lime in the hydrated form were used. A rotation of soy beans for seed, rye, wheat and sweet clover for green manure has been followed. Owing to a late spring application of lime and late seeding of soy beans the first year, the crop was very poor and the results are not given. In table 10 are presented the results for the rye and wheat crops.



FIGURE 9.—This soil responds to complete fertilizers. No. 1, no treatment; No. 2, lime; No. 3, lime, phosphoric acid and potash. Sweet clover, Cass County Farm.

TABLE 10—Cass County lime experiments.

	Rye, 1918.	Wheat, 1920.	
	Grain—bushels.	Grain—bushels.	Straw—lbs.
Hydrated lime (N 100-P 200).....	21.60	16.0	2,112
Marl (N 100-P 200).....	18.40	19.2	1,632
80-mesh (N 100-P 200).....	21.28	16.0	1,568
40-60-mesh (N 100-P 200).....	18.36	15.53	1,568
10-20-mesh (N 100-P 200).....	14.40	11.73	1,152
Check (N 100-P 200).....	12.42	9.6	1,120
No treatment.....	12.82	3.46	384

The sweet clover although grown for green manure in the season of 1921 showed little differences in growth where the soil was treated with marl, hydrated lime and 80-mesh limestone. The growth of sweet clover in 1920 was less as the coarseness of the limestone increased.

Lime has been used to less advantage in Emmet and Cheboygan counties. Experiments conducted on sandy soils with light to medium heavy subsoils in Emmet and Cheboygan counties show, as an average of three fields where lime was applied at the rate of 2 tons to the acre, an increase of 1.9 bushels of rye but none in case of the straw. Lime did not affect the growth of the 1920 spring seeding of sweet clover and alfalfa on these projects. It is very doubtful if lime can be used economically on these special types of soil.

Experiments conducted on the Manistee county farm near Manistee and on the farm of Thomas Moore near Thompsonville, indicate that lime may be used with profit in this section. The soils are rather light sands on open sandy subsoils. In each case 2.5 tons of lime were applied in the fall of 1919. On the county farm the lime increased the yield of



FIGURE 10.—Marl brings good results on the farm of S. A. Foster, near Okemos.

rye 4.52 bushels per acre and resulted in an excellent stand of alfalfa that was seeded with the rye. Alfalfa seeded on the untreated land was a failure. On the farm of Mr. Moore the limed plot yielded 7.99 bushels more rye per acre than the unlimed portion of the field. In this case the increased yield of rye the first year of the rotation paid for the cost of the lime and left a profit of 73 cents per acre.

BARNYARD MANURE.

Experiments are being carried on to determine the value of barnyard manure. At the Van Buren county farm near Hartford 10 tons of manure were applied in the spring of 1917. The soil in question is a poor sandy loam. The manure increased the yield of the oat crop 14.6 bushels of grain and 284 pounds of straw. Clover showed a slight gain of 44 pounds per acre. From the two crops the gross returns amount to \$10.41 per acre.

Other experiments on the farm of John Wheeting near Imlay City are in progress. The soil is a sand underlaid by a sand silt subsoil

not very retentive of water. The yield from the first two crops of a 4-year rotation is given in table 11.

TABLE 11.—Value of manure on Wheating Farm.

	Corn.		Oats.	
	Grain— Bu.	Stover— Lbs.	Grain— Bu.	Straw— Lbs.
Manure, 4 tons.....	42.85	2,860	54.72	2,280
No treatment.....	35.28	2,800	29.20	960

The gross returns from the manure amounted to \$30.05 per acre.

A similar test conducted on the farm of Paul Schnelle near Clarion, Emmet county, gave excellent returns in 1920. Eight tons of manure were applied to a hardwood sand which was later seeded to rye. The increase in yield of rye on the manured plot over the unmanured plot amounted to \$18.63 gross per acre the first of a four-year rotation.

TOP DRESSING WHEAT LAND WITH COMMERCIAL NITROGEN.

The value of top dressing wheat with commercial nitrogen has been investigated for two years. The applications were made as early in the spring as the land was in suitable condition for it. Two divisions of soils have been worked on, namely, sands and light sandy loams; and heavy sandy loams and heavier types. All of these lie in the southern half of the lower peninsula. The materials used for top dressing were sodium nitrate and ammonium sulphate. The application consisted of 9.18 pounds of nitrogen per acre or 60 pounds of sodium nitrate and 41.8 pounds of ammonium sulfate. Twenty-four trials have been made on the light types of soil. An average increase of 5.34 bushels over the untreated was obtained where nitrogen was applied. After having deducted the cost of the commercial nitrogen in the form of nitrate of soda the net returns were \$7.98 per acre.

Twenty-eight trials have been made on the heavy types of soil. An average of all tests on the heavy soils shows an increase of .78 bushels per acre. After having considered the cost of the nitrogen a loss of \$1.14 per acre resulted. The detailed report of these tests is given in the February issue of the 1921 Experiment Station Quarterly.

TESTS WITH ROCK PHOSPHATE—HEAVY SOILS.

Three trials have been made using rock phosphate alone and in combination with other fertilizing materials. Where used alone at the rate of 2,000 pounds per acre on the farm of W. C. Kempster at Coldwater excellent results have been obtained. The soil is a heavy silt loam on a tight subsoil. Two crops, oats and wheat, of a four-year rotation have been harvested and after having deducted the cost of the rock phosphate returns amounting to \$23.88 per acre have been derived.

Experiments have been conducted over a three-year period on the Van Buren county farm near Hartford, the soil of which is a heavy sandy loam. In these tests 2,000 pounds of rock phosphate per acre

in combination with nitrogen and potash have been used. From one crop of oats and two crops of clover \$6.64 per acre have been obtained, that is above the cost of the phosphate. On the same field rock phosphate has been used at the rate of 1,000 pounds per acre in conjunction with 10 tons of barnyard manure. After having deducted the cost of the phosphate returns of \$14.79 per acre have derived from one oat crop and two clover crops.

The use of rock phosphate at the rate of 2,000 pounds in conjunction with marl the first two years of a four-year rotation has shown a net loss of \$22.35 per acre on the farm of Jas. Richards near Eau Claire. The soil is a silt loam with a tight subsoil.

LIGHTER TYPES OF SOIL.

Rock phosphate where used on the lighter types of soil has not been as promising in the early stages of the tests as it has when used on heavy land.

Applications of 2,000 pounds of rock phosphate with 3 tons of lime per acre were made on the Cass county farm near Cassopolis. At the end of a four-year rotation of soy beans for seed, rye, wheat and soy beans for green manure, a loss of 84 cents per acre was obtained.

Experiments carried on with sandy soil in Emmet and Cheboygan counties where 2,000 pounds of rock phosphate have been used alone, show an average loss of \$12.94 per acre on the first crop of a four-year rotation.

Applications of rock phosphate to a portion of an outwash sand plain, belonging to E. D. Fairchilds, resulted in a loss of \$18.78 per acre from two crops, corn and rye, of a four-year rotation.

TESTS WITH ACID PHOSPHATE.

The results obtained from experiments with the use of acid phosphate alone and together with combinations of lime, nitrogen and potash vary considerably on heavy and light soils.

LIGHT SOILS, SAND TO LIGHT SANDY LOAMS.

Experiments are being conducted on sandy soils in Emmet and Cheboygan counties. The soil types are hardwood sands with light to medium heavy subsoils. Acid phosphate was applied at the rate of 250 pounds per acre on three separate areas. The average increase of rye for the first year shows 3.73 bushels of grain and 173 pounds of straw over adjacent unphosphated lands. For the first year this gives returns of \$2.28 per acre after deducting the cost of the acid phosphate. On the same lands a combination of 250 pounds of acid phosphate and sodium nitrate (100 pounds per acre) was used on rye. The treated plots yielded an increase of 13.82 bushels of grain and 219 pounds of straw, or when the cost of both sodium nitrate and acid phosphate are considered, returns of \$13.10 per acre. On the same lands combinations of 250 pounds of acid phosphate, 100 pounds of sodium nitrate and 100 pounds of muriate of potash were used. The combination of the three materials gave an increase of 11.67 bushels of grain and 823 pounds of straw per acre. The returns from the first crop above the cost of materials amounted to 3.49 per acre. Under the conditions of land in this

district it seems from our present knowledge that combinations of acid phosphate and sodium nitrate will give the most profitable returns.



FIGURE 11.—Acid phosphate where needed improves the quality of grain. On the right, grain grown on phosphated land; on the left, none. W. J. Guthrie Farm, Mendon.

The results obtained in Cass county are striking. Experiments were inaugurated in 1917 on the Cass county field spoken of previously. Acid phosphate was applied twice during a four-year rotation on land limed at the rate of 3.15 tons per acre. A four-year rotation of soy beans for seed, rye, wheat and soy beans for green manure was followed with the following increase in yields: Soybeans, .02 bushels; rye, 2.10 bushels; wheat, 1.93 bushels and 450 pounds of green weight in soy beans. The profit above the cost of material amounted to 71 cents per acre. Where acid phosphate was combined with sodium nitrate (100 pounds per acre each year) on the same soil and the same rotation it gave the following increases in yield over limed check plots: soy beans, .77 bushel; rye, 4.09 bushels; wheat, 10.67 bushels, green weight of soy beans 680 pounds or returns of \$11.44 per acre after deducting costs of materials. When acid phosphate was used in connection with sodium nitrate (100 pounds per acre per rotation) and 100 pounds of muriate of potash per four-year rotation the increase over the lime-treated check amounted to the following: Soy beans, 1.07 bushels; rye, 10.42 bushels; wheat, 14.94 bushels and green weight of soy beans 680 pounds or a profit after deducting the cost of material of \$22.20 per acre.

Similar tests are being conducted on two poor sandy soils in Manistee county. Acid phosphate when used alone at the rate of 250 pounds per acre has increased the average yield of rye on the two fields, 9.22 bushels and 620 pounds of straw. Although this is only the first crop of a four-year rotation after deducting the cost of the materials a profit of \$13.83 per acre remains. On the same soil acid phosphate in combination with sodium nitrate (100 pounds per acre per year) gave an average increase of rye over an untreated plot of 12.28 bushels of grain and 612 pounds

of straw or a profit of \$12.36 per acre above the cost of the fertilizing materials. When acid phosphate was used in combination with sodium nitrate (100 lbs. per acre) and potash as the muriate, at the rate of 100 pounds per acre per rotation an average increase of 11.97 bushels of grain and 964 pounds of straw resulted. After deducting the cost of materials a return of \$4.50 was obtained.

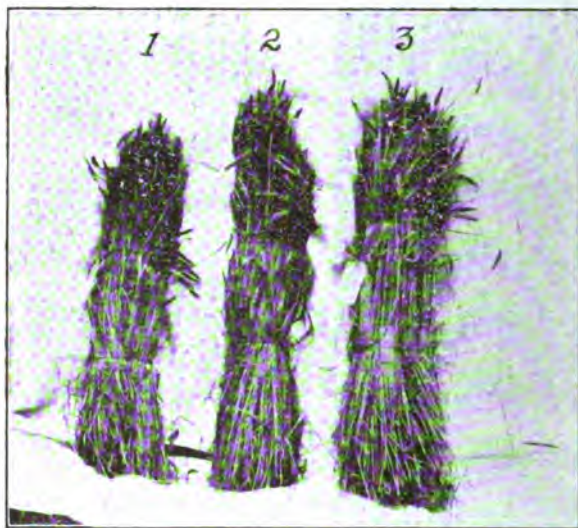


FIGURE 12—Complete fertilizers are profitable on the farm of M. A. Sowerby, Irving. No. 1, acid phosphate; No. 2, acid phosphate and nitrate of soda; No. 3, the same as No. 2, plus potash.

HEAVY SANDY LOAMS, SILT LOAMS.

Acid phosphate when used alone on heavy types of soil with rather impervious subsoils has given good returns.

Fertilizer tests are being conducted on the farm of W. C. Kempster near Coldwater. This soil is a heavy silt loam on a rather heavy clay subsoil. Acid phosphate was applied at the rate of 200 pounds per acre. The increase in yield of oats and wheat, the first two crops of the rotation is as follows: Oats, 5.15 bushels of grain, straw 788 pounds, and wheat 10.15 bushels of grain and 750 pounds of straw. After deducting the cost of the material a profit of \$26.34 per acre remains. On the same soil an application of 266 pounds per acre of a 2-12-2 commercial fertilizer, which adds the same amount of phosphoric acid per acre as the acid phosphate, the increase in grain due to this fertilizer amounted to 12 bushels of oats, 656 pounds of straw, 4.93 bushels of wheat and 630 pounds of straw. The profits above the cost of the fertilizer amounted to \$17.83 per acre.

Similar work is being carried on on the farm of Mr. McCartney near Morrice. The soil is composed of a typical silt loam on a clay subsoil which has been farmed for a long period of years. An application of acid phosphate at the rate of 250 pounds per acre resulted in an increase of 8.68 bushels of wheat per acre or a return of \$12.35 per acre above the cost of the fertilizer. On this same field 250 pounds of acid phosphate and sodium nitrate (100 pounds per acre) gave an increase of



FIGURE 13.—250 pounds of a 2-12-2 increased the yield of wheat 16.7 bushels per acre. W. J. Guthrie's Farm, Mendon.

14.83 bushels of wheat per acre or a return of \$21.16 when the cost of the materials is deducted. On an adjacent plot acid phosphate, sodium nitrate and muriate of potash (100 pounds per acre) were applied. They increased the yield of wheat 16.18 bushels over an adjacent untreated part of the field. The profits amounted to \$15.06.

Acid phosphate was applied at the rate of 250 pounds per acre to a silt loam on a tight subsoil belonging to W. J. Guthrie near Mendon. The increase in wheat due to the fertilizer amounted to 16.21 bushels per acre. The value of the increase amounted to \$28.42 after the cost of the phosphate was deducted. A 2-12-2 fertilizer was applied to an adjacent plot at the rate of 250 pounds per acre and resulted in an increase of 16.73 bushels of wheat per acre which gave a return of \$28.39 above the cost of the material.

An application of 200 pounds per acre of acid phosphate on the farm of S. Simpson near Vicksburg, whose soil is a silt loam on a tight subsoil, gave an increase in yield of 9.96 bushels of wheat, the profit amounting to \$16.72 per acre.



FIGURE 14.—Simpson Farm. Acid phosphate and no treatment.

FERTILITY REMOVAL AND FARM PROFITS.

It is highly desirable for a farmer to know what it costs him to produce his various crops. This cost is complicated by many conditions one of which is the removal of plant-food elements from the soil. The question that has been asked us is—"What constitutes a reasonable charge for this loss of fertility?" In replying to this question it must be borne in mind that few if any soils contain the various plant food elements in the same proportion in which they occur in crops. That is to say a soil may contain a sufficient amount of one element to produce several hundred or possibly a thousand maximum crops. An addition of this element may not markedly increase the yield and its use except in small amounts to increase the readily available supply may not be good agricultural practice. It does not appear to be logical to take into account the removal of elements which are present in abundance, and which when applied do not increase the yield. Later if the supply of such becomes so depleted that their application to the soil increases the yield it will then be proper to add their cost to the other items. On the other hand there may be so little of a certain element or elements that an application of it or them to the soil in the form of commercial fertilizers materially increases the yield. It is good business practice to supply the deficient element or elements if it can be done profitably.

Potash is present in relative abundance in most of our soils. Many muck and peat deposits are so deficient in it that they soon require its addition in some form in order to produce satisfactory yields as well

as suitable quality of crops. If it is necessary to apply this material to the mineral soils to increase the available supply the amount required should be considered in estimating the returns from the land.

Chemical analyses and field experiments have shown that most Michigan soils are deficient in and respond to applications of phosphoric acid. The cost of such applications therefore may reasonably be included in calculating the returns. This may be simplified by charging the cost of a 400-pound application of 16% acid phosphate per acre every four years. This amount is sufficient to produce approximately 25 bushels of wheat, 40 bushels of corn, 50 bushels of oats and 2 tons of clover not including the straw and stover. The majority of our soils also need approximately two tons of ground limestone every six years and the cost of this should be spread over the various crops as shown later.

Nitrogen is present in such quantities that the supply must be maintained and in many soils increased in order to give the most economical yields. The farmer is warranted therefore in adding the cost of replacing this nitrogen by means of legumes to the price of his products. If conditions are such however that nitrogen must be applied in the commercial form the cost of adding this to the soil should be included.

This raises the question of the cost of production of a pound of nitrogen on the farm. The cost of production of a pound of nitrogen by means of leguminous crops in a rotation is difficult to determine. It should be conceded that much of the benefits derived from the use of lime is due to its effect on the legumes such as clovers and alfalfa. It seems fair to charge two-thirds the cost of the lime to these crops and also the phosphate that should be added to the soil for their benefit. If two tons of lime are applied per acre and endure six years and a four-year rotation is followed and two seedings of clover, vetch or soy beans are obtained and one hundred pounds of acid phosphate are added to each seeding the cost of nitrogen runs from five to eight cents a pound. If no lime is added to the land naturally the cost is less or from two to four cents. Alfalfa is the cheapest source of nitrogen. On the same basis as in the first case above, nitrogen may be produced for less than one-half what it costs when obtained by means of other legumes. If the crop stands four years instead of six the cost is slightly higher.

APPENDIX.

The balance of plant-food elements on farms differently managed has been worked out in detail but owing to the size and complexity of the tables it seemed advisable to submit them as an appendix rather than earlier in the publication.

In making these calculations information gained by Dr. H. G. Armsby in his digestion experiments was made use of. For the composition of the various farm crops the tables published by Dr. L. Van Slyke and Dr. C. G. Hopkins were utilized. Information concerning the number of stock found on the types of farms considered and the amounts of feed of various kinds consumed was obtained from members of the Animal Husbandry and Dairy Sections. We desire to express our appreciation of this co-operation.

100 ACRE GRAIN FARM, CARRYING

Crops produced.	Plant-food elements in produce.			Consumed by stock.			
	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
Hay, 10 A.-20 T.	*800.0	201.5	720.0	12.5 T ..	500	125.95	450.0
Corn, 15 acres:							
Grain, 600 bu.	556.8	219.87	132.0	45 bu.	41.76	16.49	9.9
Stover, 18.1 T.	362.0	110.53	505.4	3 T.	60.0	18.31	83.77
Oats, 20 acres:							
Grain, 1,200 bu.	768.0	318.81	230.4	613 bu.	392.32	162.81	117.70
Straw, 30 T.	384.0	120.93	748.8	Fed., 5 T. Bed. 5.5 T.	64.0	20.16	124.8
Total consumed by stock					1,058.08	343.72	786.17
Wheat, 25 acres:							
Grain, 625 bu.	750.0	320.00	150.0				
Straw, 31 T.	310.0	94.24	371.0				
Beans, 15 acres:							
Grain, 300 bu.	720.0	219.87	234.28				
Straw, 12 T.	312.0	71.46	456.00				
Potatoes, 5 acres:							
1,000 bu.	210.0	90.0	300.0				
Pasture, 10 acres	572.7	160.32	477.25		572.7	160.32	477.25
Total removed from soil	4,945.5	1,927.53	4,325.13				

*Taken from the air.

2 COWS, 14 HOGS, 5 HORSES.

Sold from farm.				Returned to soil.			
Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
7.5 T.....	300.00	75.55	270.0				
555 bu.....	515.04	203.38	122.1	15.1 T.....	302.0	92.21	421.62
587 bu.....	375.68	156.00	112.70				
19.5 T.....	249.6	78.61	486.72		70.4	22.17	137.28
625 bu.....	750.0	320.0	150.0				
31 T.....	310.0	94.24	371.0				
300 bu.....	720.0	219.87	234.28	12 T.....	312	71.46	456.00
1,000.....	210.0	90.0	300.0				
Total.....	3,430.32	1,237.65	2,046.80	Total...	684.4	185.84	1,014.90

GENERAL FARM, CARRYING 6 COWS.

Crops produced.	Plant-food elements in produce.			Consumed by stock.			
	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phos- phoric acid, pounds.	Potash, pounds.
Hay, 10 acres-20 T....	*800.0	201.5	720.0	17 T....	680.0	171.28	612.0
Corn, 15 acres:							
Grain, 600 bu.....	556.8	219.87	132.0	287 bu...	266.34	105.17	63.14
Stover, 18.1 T.....	362.0	110.53	505.4	11.3 T...	226.0	69.0	315.49
Oats, 15 acres:							
Grain, 900 bu.....	576.0	239.11	172.8	800 bu...	512.0	212.54	153.6
Straw, 22.5 T.....	288.0	90.70	561.6	Fed., 8 T.	102.4	32.24	199.68
				Bed., 8 T			
Total consumed by stock.....					1,786.74	590.23	1,343.91
Barley, 10 acres:							
Grain, 340 bu.....	285.6	124.6	81.6				
Straw, 11 T.....	132.0	43.51	242.0				
Wheat, 15 acres:							
Grain, 375 bu.....	450.0	192.00	90.0				
Straw 18.6.....	186.0	56.54	222.6				
Beans, 15 acres:							
Grain, 300 bu.....	720.0	218.87	234.28				
Straw, 12 T.....	312.0	71.46	456.00				
Potatoes, 5 acres:							
1,000 bu.....	210.0	90.0	300.0				
Pasture, 15 acres....	859.05	240.48	715.88		859.05	240.48	715.88
Total removed from soil.....	4,037.45	1,900.17	4,434.16				

* Taken from the air.

14 HOGS, 4 CATTLE, 5 HORSES.

Sold from farm.				Returned to soil.			
Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
3 T.....	120.0	30.22	108.0				
313 bu.....	290.46	114.70	68.86	6.8 T.....	136.0	41.52	190.15
100 bu.....	64.0	26.56	19.2				
6.5 T.....	83.2	26.20	162.24	8 T.....	102.4	32.24	199.68
340 bu.....	285.6	124.6	81.6				
11 T.....	132.0	43.51	242.0				
375 bu.....	450.0	192.0	90.0				
18.6 T.....	186.0	56.54	222.6				
300 bu.....	720.0	219.87	234.28	12 T.....	312.0	71.46	456.0
1,000 bu.....	210.0	90.0	300.0				
Total.....	2,541.26	924.20	1,528.78	Total..	550.4	145.22	845.83

DAIRY FARM, 20 COWS, 5

Crops produced.	Plant-food elements in produce.			Consumed by stock.			
	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phos- phoric acid, pounds.	Potash, pounds.
Hay, 10 A-20 T.....	*800.0	201.5	720.0	20 T.....	800.0	201.5	720.0
Corn, 10 acres:							
Grain, 400 bu.....	371.2	146.56	88.0	250 bu....	232.0	91.6	55.0
Stover, 12 T.....	240.0	73.28	336.0	7.5 T....	150.0	45.8	210.0
Corn, 10 acres:							
Silage, 100-T.....	680.0	229.00	880.0	100 T....	680.0	229.0	880.0
Oats, 20 acres:							
Grain, 1,200 bu....	768.0	318.77	230.4	800 bu....	512.0	212.51	153.6
Straw, 30 T.....	384.0	120.91	748.8	Fed., 6.5 T.	83.2	26.1	162.24
				Bed. 17.5 T			
Barley, 10 acres:							
Grain, 340 bu.....	285.6	124.57	81.6	340 bu....	285.6	124.57	81.6
Straw, 11 T.....	132.0	43.51	242.0	.....	.....	.....	.....
Beans, 10 acres:							
Grain, 200 bu.....	480.0	146.56	156.19	.....	.....	.....	.....
Straw, 8 T.....	208.0	47.63	304.00	.....	.....	.....	.....
Purchased bran:							
7.5 T.....	.....	.....	.....	7.5 T....	397.5	439.74	240.00
Total consumed by stock.....	.....	.....	.....	.....	3,140.3	1,370.82	2,502.44
Pasture, 30 A.....	1,718.1	480.9	1,431.75	.....	.....	.....	.....
Total removed from soil.....	5,266.9	1,933.19	5,218.74

*Taken from the air.

SOIL FERTILITY

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HORSES, 10 CATTLE, 20 HOGS.

Sold from farm.				Returned to soil.			
Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
150 bu.....	139.2	54.96	33.0	4.5 T....	90.0	27.48	126.0
400 bu.....	256.0	106.25	76.8	17.5 T....	224.0	70.62	436.8
6 T.....	76.8	24.18	149.76				
11 T.....	132.0	43.58	242.0				
200 bu.....	480.0	146.56	156.19	8 T.....	208.0	47.63	304.0
Total.....	1,084.0	375.53	657.75	Total..	522.0	145.73	866.8

PLANT FOOD BALANCE ON A 100-ACRE GENERAL FARM GROWING 25 ACRES

Crops produced.	Plant-food elements in produce.			Consumed by stock.			
	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phos- phoric acid, pounds.	Potash, pounds.
Clover hay, 25 A-50 T.	*2,000.0	503.75	1,800.00	17 T.	680.00	171.28	612.00
Corn, 10 acres:							
Grain, 400 bu.	371.2	146.58	88.00	287 bu. ...	266.34	105.17	63.14
Stover, 12.33 T.	242.0	73.68	336.94	11.3 T. ...	221.82	67.51	308.94
Oats, 15 acres:							
Grain, 900 bu.	576.0	239.11	172.80	800 bu. ...	512.00	212.54	153.00
Straw, 22.5 T.	288.0	90.70	561.60	Fed., 8 T.	102.40	32.24	199.68
Bed, 8 T.				Bed, 8 T.			
Wheat, 17 acres:							
Grain, 425 bu.	510.0	217.60	102.00				
Straw, 21 T.	210.8	64.05	252.28				
Potatoes, 3 acres:							
600 bu.	126.0	57.00	180.00				
Beans, 7 acres, 140 bu.:	336.0	102.60	109.34				
Straw, 5.6 T.	145.6	32.32	212.80				
Barley, 8 acres:							
Grain, 272 bu.	228.48	99.68	65.02				
Straw, 8.8 T.	105.6	34.08	193.60				
Pasture, 15 acres.	859.05	240.48	715.88		859.05	240.48	715.88
Total.	3,998.73	1,901.63	4,790.26		2,641.61	829.22	2,053.24

OF CLOVER AND CARRYING 6 COWS, 4 CATTLE, 14 HOGS AND 5 HORSES.

Sold from farm.				Returned to farm.			
Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
33 T.....	1,320.00	332.47	1,188.00	.....	.....	.....	.....
113 bu.....	104.86	41.41	24.86	1.03.....	20.22	6.15	28.16
100 bu.....	64.00	26.56	19.20	.....	.....	.....	.....
6.5 T.....	83.20	26.19	162.24	8 T.....	102.40	32.24	199.68
.....
425 bu.....	510.00	217.60	102.00	.....	.....	.....	.....
21 T.....	210.80	64.05	252.28	.....	.....	.....	.....
.....
600 bu.....	126.00	57.00	180.00	.....	.....	.....	.....
140 bu.....	336.00	102.60	109.34	5.6 T....	145.60	32.32	212.80
.....
272 bu.....	228.48	99.68	65.02	.....	.....	.....	.....
8.8 T.....	105.60	34.08	193.60	.....	.....	.....	.....
.....
.....	3,088.94	1,001.61	2,296.54	.....	268.22	70.71	440.64

PLANT FOOD BALANCE ON A 100-ACRE SANDY FARM WITH A SHORT ROTATION.
AND 5

Crops produced.	Plant-food elements in produce.			Consumed by stock.			
	Nitrogen, pounds.	Phosphoric acid, pounds.	Potaash, pounds.	Produce.	Nitrogen, pounds.	Phos- phoric acid, pounds.	Potaash, pounds.
Clover hay, 25 A-37.5, T	*1,500.00	377.81	1,350.00	20.5 T	820.00	206.53	738.00
Soybeans, 5 acres:							
Grain, 60 bu.....	190.80	64.80	72.00				
Tops, 5 T.....	90.00	30.00	75.00				
Corn, 13 acres:							
Grain, 390 bu.....	361.92	142.91	85.80	390 bu	361.92	142.91	85.80
Stover, 11.7 T.....	234.00	71.44	326.66	11.7 T	234.00	71.44	326.66
Barley, 9 acres:							
Grain, 225 bu.....	189.00	82.46	54.00	225 bu	189.00	82.46	54.00
Straw, 7.5 T.....	90.00	29.66	165.00				
Beans, 5 acres:							
Grain, 75 bu.....	180.00	54.96	58.56				
Straw, 3 tons.....	78.00	17.86	114.00	3 T	78.00	17.86	114.00
Rye, 20 acres:							
Grain, 400 bu.....	382.00	196.00	134.00				
Straw, 20 T.....	200.00	120.00	340.00				
				Bed., 8 T			
Potatoes, 3 acres:							
450 bu.....	94.50	40.50	135.00				
Pasture, 20 acres.....	859.05	240.48	715.88		859.05	240.48	715.88
Bought 250 bu. oats.....				250 bu	160.00	66.40	48.00
Total.....	2,949.27	1,468.88	3,625.90		2,701.97	828.08	2,082.34

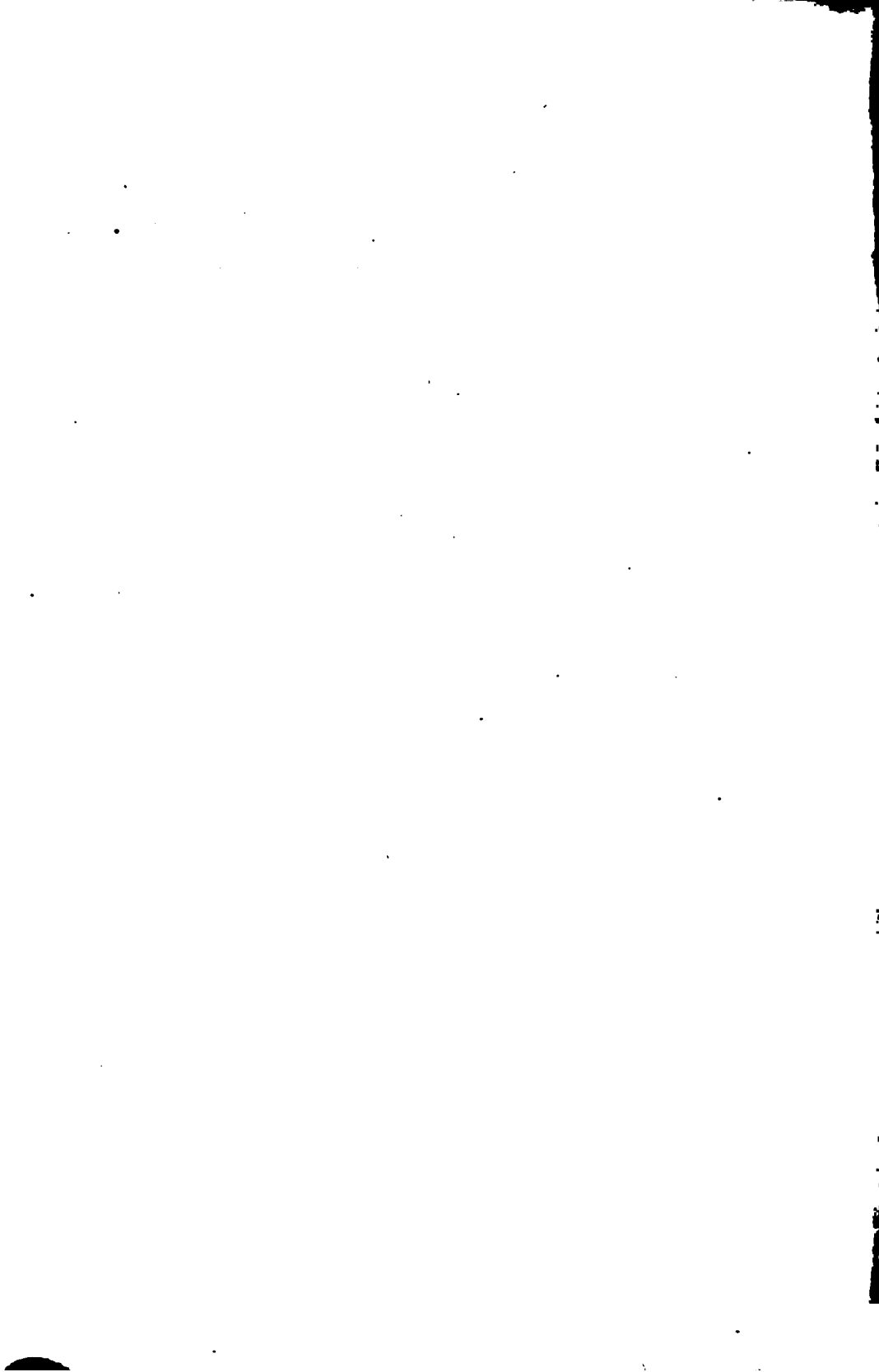
*Taken from the air.

SOIL FERTILITY

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INCLUDING 25 ACRES OF CLOVER AND CARRYING 6 COWS, 4 CATTLE, 14 HOGS
HORSES.

Sold from farm.				Returned to soil.			
Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.	Produce.	Nitrogen, pounds.	Phosphoric acid, pounds.	Potash, pounds.
17 T.....	680.00	171.27	612.00	.....	.....	.....	.....
60 bu.....	190.80	64.80	72.00	5 T.....	90.00	30.00	75.00
.....
.....
7.5 T.....	90.00	29.66	165.00	.....	.....	.....	.....
75 bu.....	180.00	54.96	58.56	.....	.....	.....	.....
.....
400 bu.....	382.00	196.00	134.00	.....	.....	.....	.....
12 T.....	120.00	72.00	204.00	8 T.....	80.00	48.00	136.00
.....
450 bu.....	94.50	40.58	135.00
.....
.....
.....
.....	1,737.30	629.19	1,380.56	170.00	78.00	211.00



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FERTILIZER ANALYSES

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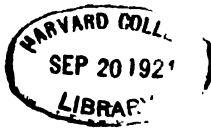
AGRICULTURAL EXPERIMENT STATION

of the

MICHIGAN AGRICULTURAL COLLEGE

CHEMICAL SECTION

EAST LANSING, MICHIGAN



The State

During the last regular session of the legislature the bill (Act 12, P. A. 1921) creating the Department of Agriculture was passed. By a provision of this bill the inspection of commercial fertilizers will, on and after July 1st, 1921, be conducted under the direction of the Department of Agriculture. All communications in regard to licensing or inspection and analysis of commercial fertilizers should, after the above mentioned date, be directed to the Commissioner of Agriculture, Lansing, Michigan.

FERTILIZER ANALYSES.

This bulletin contains the results of the inspection of commercial fertilizers for the year 1920 and the spring season of 1921. The analyses and discussion of the results are given separately for the two years.

The fertilizer inspection has been conducted by the Experiment Station since 1885 when the first law, regulating the sale and distribution of commercial fertilizers in Michigan, was passed. The first inspection bulletin was published in 1886 by the late Dr. R. C. Kedzie. That bulletin contained the analyses of only 15 samples. Since then an inspection bulletin has been published annually with the exception of two years, making a total of 34 bulletins including the current issue. The number of samples analyzed during the year has increased to over 1000.

During the time that the fertilizer inspection has been conducted by the Experiment Station only one case has been prosecuted and that was against a local dealer who sold a carload of ground limestone representing it to be a mixture of rock phosphate and ground limestone. The details of this case are given in Bulletin No. 283. It has been our experience that the publicity given the results through the distribution of the annual fertilizer bulletin is a far greater and more potent force in the prevention of fraud than any amount of fines that might be imposed by the courts.

In 1914 we first published results showing the quality of the nitrogen used in mixed fertilizers. This has been continued since that time and, as a result, there has been a gradual and steady improvement in the quality of the nitrogen. One may now be reasonably sure of getting nitrogen of good quality in practically all of the higher grade fertilizers. This is not so true of the low grade mixtures, which fact constitutes one of the chief arguments against buying such fertilizers. In this connection it is gratifying to note that the National Fertilizer Association, at their recent meeting, unanimously went on record as favoring high analysis fertilizers.

The actual consumption of commercial fertilizers during the earlier years is not known, but was, of course, very small. During the year 1906, when the first attempt was made to determine the fertilizer consumption it was estimated at 20,000 tons. This has steadily increased until last year, 1920, when, based upon reports received from the manufacturers, it reached the high point of 112,616 tons. The distribution of this amount throughout the State is shown in the following table:

REPORTED FERTILIZER SALES, BY COUNTIES, FOR SEASON 1920

County	Spring	Fall	Total
Alcona.....	15	.....	15
Allegan.....	1063½	1370	2433½
Alpena.....	176	.....	176
Antrim.....	118½	59	177½
Arenac.....	64	.....	64
Barry.....	342½	522	864½
Bay.....	1033½	328	1361½
Benzie.....	¼	.....	¼
Berrien.....	1386½	1658	3044½
Branch.....	378½	516	894½
Calhoun.....	310½	350½	660½
Cass.....	127½	149	276½
Charlevoix.....	267	107	374
Cheboygan.....	44½	.....	44½
Clare.....	40	31	71
Clinton.....	653	2315	2968
Crawford.....	2	.....	2
Eaton.....	1482	2488½	3970½
Emmet.....	159	68	227
Genesee.....	2554½	2674	5228½
Gladwin.....	109	53	162
Grand Traverse.....	113½	41	154½
Gratiot.....	1772	1554	3326
Hillsdale.....	1059½	1361	2420½
Huron.....	1593	2275½	3868½
Ingham.....	892	1029	1921
Ionia.....	708	1974½	2682½
Iosco.....	131	.....	131
Isabella.....	628	240	868
Jackson.....	451	222	673
Kalamazoo.....	1236	644	1880
Kalkaska.....	24½	.....	24½
Kent.....	1497½	1793	3290½
Lake.....	4	.....	4
Lapeer.....	1611	1605	3216
Leclanau.....	291	118	409
Lenawee.....	2885½	1653½	4539½
Livingston.....	305½	230	535½
Macomb.....	3033½	2779	5812½
Manistee.....	19	.....	19
Mason.....	102½	30	132½
Mecosta.....	38	21	59
Midland.....	107	50	157
Missaukee.....	86	.....	86
Monroe.....	2808	2614½	5422½
Montcalm.....	628	840	1468
Montmorency.....	12	.....	12
Muskegon.....	332½	383½	716
Newaygo.....	294½	90	384½
Oakland.....	1154½	1058	2212½
Oceana.....	264½	144	408½
Ogemaw.....	19	30½	49½
Osceola.....	91	75	166
Oscoda.....	16	.....	16
Otsego.....	20½	¼	21
Ottawa.....	2734	2878	5612

REPORTED FERTILIZER SALES, BY COUNTIES, FOR SEASON 1920.—Continued

County	Spring	Fall	Total
Presque Isle.....	121	53	174
Roscommon.....	.....	.....	.....
St. Clair.....	2682	2716	5398
St. Joseph.....	129¼	100	229¼
Saginaw.....	1985½	2107½	4093
Sanilac.....	2851	3200¼	6051½
Shiawassee.....	961½	1794¼	2756
Tuscola.....	3723¼	2397¼	6121
Van Buren.....	885¼	822	1707¼
Washtenaw.....	1715¼	2225	3940¼
Wayne.....	2691¼	2077	4768¼
Wexford.....	53	169	222
Alger.....	.....	.....	.....
Baraga.....	.....	.....	.....
Chippewa.....	3	.....	3
Delta.....	41¼	.....	41¼
Dickinson.....	18	.....	18
Gogebic.....	15	.....	15
Houghton.....	35¼	.....	35¼
Iron.....	.....	.....	.....
Keweenaw.....	.....	.....	.....
Luce.....	16	.....	16
Mackinac.....	8	½	8½
Marquette.....	64	.....	64
Menominee.....	986½	15	1001½
Ontonagon.....	.....	.....	.....
Schoolcraft.....	239	.....	239
	57515¼	55100¼	112616

LICENSED BRANDS.

During the year, 1920, 37 manufacturers and fertilizer companies licensed 426 brands for sale in Michigan. One new company, The Southern Fertilizer and Chemical Company, registered 20 brands during the fall season. Of this number, however, 12 were not shipped into the State. The U. S. Gypsum Company, Chicago, Ill. and the R. H. Hoover Laboratories, Inc., Freeport, Ill., licensed "Ben Franklin Agricultural Gypsum" and "Plantlife" respectively, after the regular fertilizer season had closed. No samples of either brands have been found on the markets and they are not included in the tables of analyses.

Attention is called to the fact that the fertilizer law covers only those materials which are sold, offered or exposed for sale within the State, the retail price of which is \$10.00 or more per ton. Manufacturers residing outside the State may ship direct to the consumer without paying the license fee but the party making the purchase receives no protection under the law. If the sale of fertilizer to be shipped direct to the consumer is made by an agent or representative of the manufacturer while in the State, the act is considered as one of actually offering the material itself for sale, and the fertilizer then becomes subject to the requirements of the law just as surely as though the fertilizer were actually brought into the State and then sold. Consequently, an agent of a fertilizer company is technically violating the law when he solicits or accepts orders for any unlicensed fertilizer, while in the State.

COLLECTION OF SAMPLES.

The collection of samples was made during the spring and fall shipping seasons by Inspectors appointed by the State Board of Agriculture.

All sections of the State in which fertilizers are used to any extent were visited, and 907 samples were secured from stocks being offered for sale by dealers. For this purpose a specially constructed tube is used, which permits of securing a core from the entire length of the bag. An official sample consists of the cores taken from not less than ten separate sacks of the same brand. The ten or more separate cores are mixed together, placed in a stout sack, tied, sealed and forwarded to the laboratory for analysis.

During the year 71 registered brands were not shipped into the State. It was formerly the custom, whenever we failed to find a brand on the market, to analyze the sample forwarded by the manufacturer, as required by law, at the time of applying for the license. It has long been known that these samples were generally, if not always, made up in the laboratories of the companies and were not, therefore, representative of the product as put on the market. For this and other reasons we have discontinued this practice and in this bulletin the brands not represented by samples are listed in their proper places but are not given a laboratory number and only the guaranteed analysis is shown.

In many cases several samples of the same brand were drawn and analyzed. This, of course, greatly increases the work in the laboratory but it is the only way by which we can ascertain if the brands are running uniform. If only one sample were analyzed, or if several samples were taken and composited before being analyzed, variations in the composition would not be detected.

RESULTS OF INSPECTION.

Of the 907 samples analyzed representing 355 brands, 255 (27.1%) were found to be below guarantee* in one or more ingredient. Sixty-four (7.1%) were below guarantee in nitrogen, 2 (0.2%) were below guarantee in total phosphoric acid, 75 (8.3%) were below guarantee in available phosphoric acid and 150 (16.5%) in potash. This is a slight increase in the number of deficiencies, compared with 1919 and a considerable increase when compared to the results obtained for several years prior to 1919. This increase in the number of samples found below guarantee is undoubtedly due, in part at least, to the fact that during the war the fertilizer market was badly upset, and has not yet returned to normal. However, this does not absolve the manufacturer who consistently, year after year, has about the same number of samples falling below guarantee.

There is no provision in the fertilizer law for the payment of rebates on fertilizer shipments found to be below guarantee, but the manufacturer demonstrates his good will when he voluntarily takes care of such cases as they are called to his attention. In many cases a fertilizer is found to be below guarantee in one ingredient and to overrun the guarantee in some other ingredient sufficiently so that the actual value is not really lowered. This condition indicates imperfect mixing, or a lack of proper factory control, and while the purchaser is not defrauded from a financial standpoint he still does not get what he contracted for and what he has a right to expect.

In the following table a summary of the results of the inspection is given. This shows at a glance, the number of brands licensed by each company, the number of samples analyzed and the number falling below guarantee in one or more ingredient. In the last column is given the number of samples whose value has been found to be \$1.00 or more per ton less than that guaranteed. A careful study of this table as well as the detailed results of analysis which follow should be made by all persons who intend to purchase fertilizers for the coming season.

*A shortage of more than 0.10 per cent. of nitrogen or more than 0.20 per cent. available phosphoric acid or more than 0.10 per cent. potash is considered below guarantee.

Manufacturer	Number of Brands Licensed.	Number of Samples Analyzed.	No. below guarantee in one or more ingredient	No. below value guaranteed.
American Agricultural Chemical Co.....	101	186	7	1
Armour Fertilizer Works.....	29	57	19	11
The Barrett Company.....	1	3	0	0
R. Binder Company.....	1	1	0	0
N. Burleson.....	1	2	0	0
E. Burton Fertilizer Works.....	1	1	1	1
Calumet Fertilizer Company.....	22	50	19	3
Chicago Feed & Fertilizer Company.....	1	0	0	0
Columbia Guano Company.....	17	18	4	2
Darling & Company.....	12	44	6	0
Federal Chemical Company.....	28	66	21	11
Fertile Chemical Company.....	2	0	0	0
Gleaner Clearing House Association.....	9	13	5	0
International Agricultural Corporation.....	29	64	20	4
Jarecki Chemical Company.....	10	27	14	5
Natural Guano Company.....	1	0	0	0
Nitrate Agencies Company.....	1	0	0	0
Pacific Manure & Fertilizer Company.....	1	2	2	2
Parke, Davis & Company.....	1	0	0	0
Packers Fertilizer Company.....	9	19	9	3
Pulverized Manure Company.....	4	5	0	0
Queen City Fertilizer Company.....	1	0	0	0
Rasin Monumental Company.....	15	7	0	0
Read Phosphate Company.....	1	1	1	0
F. S. Royster Guano Company.....	20	78	28	11
Smith Agricultural Chemical Company.....	10	24	9	2
Sodus Humus Company.....	1	1	1	1
Southern Fertilizer & Chemical Company.....	20	26	13	0
J. L. & H. Stadler Rend. & Fert. Company.....	11	22	5	1
H. Stewart & Sons.....	1	1	1	0
Swift & Company.....	26	73	28	15
Tennessee Coal Iron & Railroad Company.....	1	0	0	0
Virginia-Carolina Chemical Company.....	18	42	3	1
The Welch Chemical Company.....	13	50	24	8
Wing & Evans.....	1	2	0	0
Wuichet Fertilizer Company.....	5	22	15	3
Witherbee, Sherman & Company.....	1	0	0	0
	426	907	255	89

EXPLANATION OF TABLES.

The results of analysis shown in the following tables are arranged by manufacturers, in alphabetical order. Those found below guarantee are printed in bold face type.

Nitrogen—It will be noted that the results under this heading are divided into four columns. The column headed "As Soluble" shows the amount of nitrogen that is soluble in water. This would include all nitrogen present as nitrate of soda, sulfate of ammonia, cyanimid, etc. This portion of the nitrogen is considered to be immediately available.

The second and third columns together represent the nitrogen that is insoluble in water. This insoluble nitrogen is separated into "active" and "inactive" nitrogen depending upon its reaction with an alkaline solution of potassium permanganate. When the amount shown "as active insoluble organic" is greater than that shown "as inactive insoluble organic" the whole insoluble nitrogen is considered to be of good quality. In other words, it has been derived from some high grade material possessing a high rate of availability or the material used has been treated in such manner as to render it largely available. If, on the other hand, the amount of nitrogen shown in the "inactive" column is greater than that shown in the "active" column then the *insoluble nitrogen* is considered to be low grade with a low rate of availability. When the insoluble nitrogen constitutes a small percentage of the total, its rate of availability would, of course, be of small consequence. But, where the "insoluble nitrogen" constitutes a considerable portion of the total, as is very often the case, then its rate of availability is an important factor.

Since nitrogen is, by far, the most expensive plant food ingredient in fertilizers, more attention should be given to the results printed in the following pages under this heading and when purchasing nitrogenous fertilizers preference should be given those companies that show the insoluble nitrogen in their mixtures to be derived from high grade materials.

The fourth column shows the total amount of nitrogen in the sample. It is equal to the sum of the first three columns.

Phosphoric Acid—Three divisions are included under this heading, designated as "total", "insoluble" and "available." The "total" phosphoric acid includes all of this ingredient in the sample. The "insoluble" phosphoric acid represents that portion that is unavailable and the "available" phosphoric acid, is, as the name implies, readily available. The available phosphoric acid represents the difference between the total and insoluble phosphoric acid.

Potash—The results shown under this heading are those soluble in water as required by the law. Water soluble potash is, of course, readily available.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
A 4406	American Agricultural Chemical Co., Detroit, Mich. A High Grade Garden & Vegetable Fertilizer.	Erie..... { G ⁺ P ⁺	1.16	0.27	0.21	1.65 1.64	10.25	0.62	8.00 9.63	5.00 5.21
A 4439	All Grain Fertilizer.	Novi..... { G ⁺ P ⁺	1.39	0.21	0.11	1.65 1.71	13.60	0.68	12.00 12.92	3.00 3.09
A 4474	Amo-Phos Fertilizer.	Highland..... { G ⁺ P ⁺	1.38	0.36	0.10	1.65 1.84	15.15	1.24	12.00 13.91	.....
A 3975 A 4331	Beet Fertilizer 1916..... Beet Fertilizer 1916.....	Riverdale..... Shepardsville..... { G ⁺ P ⁺	0.65 0.73	0.13 0.10	0.16 0.07	0.88 0.90	10.28 9.65	1.00 0.86	9.00 8.79	1.00 1.21
A 3968	Climax Complete Fertilizer.	Average..... { G ⁺ P ⁺	0.69	0.11	0.12	0.92	9.95	0.93	9.03	1.37
A 4280	Crown Phosphate and Potash.	Grand Ledge..... { G ⁺ P ⁺	1.29	0.29	0.22	1.65 1.80	10.25	1.24	8.00 9.01	2.00 2.26
A 4169* A 4692*	Dissolved Bone Phosphate & Potash. Dissolved Bone Phosphate & Potash.	East Lansing..... Tyre..... New Lathrop..... { G ⁺ P ⁺	13.85	1.06	12.79 10.00 10.44 11.13	2.00 2.23 2.11
A 3735 A 4262 A 4844*	Favorite Potash Fertilizer. Favorite Potash Fertilizer. Favorite Potash Fertilizer.	Average..... { G ⁺ P ⁺	11.48	0.69	10.79	2.17
A 4100	Pine Steamed Bone	Richmond..... Clayton..... Richmond..... Average..... { G ⁺ P ⁺	0.54 0.70 0.49	0.09 0.09 0.11	0.18 0.12 0.23	0.89 0.91 0.93	10.35 10.30 10.20	1.06 0.74 0.94	8.00 9.19 9.26	2.00 2.08 2.00
		Benton Harbor..... { G ⁺ P ⁺	0.58 0.74	0.10 1.02	0.17 0.26	0.85 0.95	10.25 9.65	0.91	9.34	2.06

FERTILIZER ANALYSES

[illegible]

†Abbreviations for Guaranteed and Pounded.

***Fall Samples.**

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
American Agricultural Chemical Co.—Cont.										
Bradley Brands—Cont.										
A 3969	Dissolved Bone Phosphate with Potash '16	Grand Ledge	0.57	0.14	0.13	0.89	9.60	0.92	8.00	1.00
A 4263	Dissolved Bone Phosphate with Potash '16	Clayton	0.70	0.10	0.11	0.91	9.90	1.00	8.68	1.14
A 4297	Dissolved Bone Phosphate with Potash '16	Powerville	0.66	0.10	0.11	0.87	9.45	0.84	8.90	1.11
A 4166*	Dissolved Bone Phosphate with Potash '16	Port Hope	0.52	0.20	0.22	0.94	10.50	1.00	8.61	1.01
		Average	0.61	0.14	0.14	0.89	9.86	0.94	9.50	1.10
A 4083	Sea Fowl Guano with Potash	Buchanan	1.00	0.43	0.23	1.65	10.75	1.52	8.00	1.00
A 4491	Soluble Dissolved Bone Phosphate.	Detroit					15.15	0.40	14.00	
	Crocker Brands								14.75	
	10% Acid Phosphate.								10.00	
A 3977	Ammoniated Wheat & Corn Phosphate 1916..	Coral	0.83	0.48	0.36	1.65	10.00	1.28	8.00	1.00
A 3969	Bean Grower	Pompeii	1.02	0.41	0.33	1.65	10.55	1.56	8.99	1.07
A 3976	Bean Grower	Coral	0.91	0.41	0.36	1.68	10.15	1.32	8.83	0.99
		Average	0.97	0.41	0.34	1.72	10.35	1.44	8.91	1.03
A 3785	Complete Fertilizer.	Eaton Rapids	0.67	0.13	0.18	0.88	12.05	1.08	10.00	1.00
	Dissolved Bone Phosphate.								10.97	1.00
A 3784	High Grade Phosphate.	Eaton Rapids					18.65	1.16	19.00	
A 4201	High Grade Phosphate.	Masson					18.90	0.80	18.10	
		Average					18.77	0.98	17.70	

FERTILIZER ANALYSES

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A 3786 A 4461	New Rival Ammoniated Superphosphate '16. New Rival Ammoniated Superphosphate '16.	{ G† { F†	0.65 0.44	0.12 0.15	0.16 0.16	0.88 0.93 0.75	9.65 10.10	1.06 1.08	9.00 8.59 9.02	1.00 1.00 1.10
A 3968	Sugar Beet Fertilizer.	{ G† { F†	0.55 0.70	0.13 0.09	0.16 0.11	0.84 0.88 0.90	9.88 9.80	1.07 0.86	8.81 8.94	1.05 1.00
A 3763 A 4289	Michigan Carbon Works Brands A-1 Potash Fertilizer. A-1 Potash Fertilizer.	{ G† { F†	0.63 0.61	0.06 0.12	0.15 0.16	0.88 0.84 0.89	10.30 9.95	0.86 0.78	8.00 9.44 9.17	8.00 3.07 3.53
A 3705 A 3736 A 3750 A 3751 A 3756 A 4334* A 4335*	A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916. A-1 Potash Fertilizer 1916.	{ G† { F†	0.62 0.62 0.46 0.46 0.40 0.46	0.09 0.12 0.08 0.09 0.10 0.14 0.19	0.15 0.20 0.20 0.16 0.13 0.22	0.86 0.84 0.86 0.87 0.87 0.87	10.13 10.90 10.45 8.80 10.65 10.40	0.82 1.26 1.36 1.06 1.04 1.06 1.20	9.31 8.00 8.64 8.99 7.83 8.59 9.20	3.30 1.00 1.05 1.11 1.12 1.01 1.01
A 3738 A 3920 A 4268 A 4157* A 4673*	High Potash Phosphate. High Potash Phosphate. High Potash Phosphate. High Potash Phosphate. High Potash Phosphate.	{ G† { F†	0.61 0.61	0.12 0.12	0.18 0.18	0.91 0.91	10.18 10.18	1.16 1.16	9.02 10.00 11.80 11.47 10.95 10.88 11.04	1.08 5.00 4.94 4.95 4.41 5.08 5.19
A 3706 A 3717 A 3737 A 3751 A 3756 A 4033	New Standard Fertilizer. New Standard Fertilizer. New Standard Fertilizer. New Standard Fertilizer. New Standard Fertilizer. New Standard Fertilizer.	{ G† { F†	0.58 0.69 0.45 0.62 0.70 0.59	0.18 0.16 0.16 0.22 0.18 0.23	0.19 0.16 0.22 0.17 0.14 0.12	0.88 0.95 1.01 0.83 1.01 1.02 0.94	13.45 13.15 12.80 12.65 12.15 12.65	2.02 1.50 1.80 1.74 1.48 1.58	10.00 11.43 11.65 11.00 10.81 11.07	..............................
A 3777 A 4341 A 4126*	Red Line Crop Grower. Red Line Crop Grower. Red Line Crop Grower.	{ G† { F†	1.42 1.39 1.08	0.20 0.23 0.33	0.15 0.21 0.36	1.65 1.77 1.83 1.77	9.60 9.80 10.15	1.46 1.36 1.30	8.00 8.14 8.85	8.00 1.98 2.65
	Average.		1.29	0.26	0.24	1.79	9.85	1.37	8.48	2.20

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble
American Agricultural Chemical Co.—Cont.										
Michigan Carbon Works Brands—Cont.										
A 4036	Red Line Phosphate.	Coopersville.	{ P. }				16.70	0.86	14.00	
A 4425	Red Line Phosphate.	Milan.					17.00	1.16	15.84	
		Average.					16.85	1.01	15.84	
A 3739	Red Line Phosphate with Potash.	Richmond.	{ P. }				12.80	1.26	10.00	9.00
A 4004	Red Line Phosphate with Potash.	Jamestown.					13.25	1.26	11.99	1.92
A 4217	Red Line Phosphate with Potash.	Quincy.				12.05	0.92	11.43	1.81	
A 4672*	Red Line Phosphate with Potash.	Grand Rapids.				11.05	0.54	10.51	2.35	
		Average.					12.29	0.92	11.37	1.84
A 3954	Soil Builder.	Pennville.	{ P. }	1.39	0.31	1.66	12.85	2.28	10.00	
A 4498	Soil Builder.	Columbus.		1.44	0.26	1.84	12.95	1.78	11.17	
A 4507	Soil Builder.	Okemos.	1.67	0.25	2.12	13.05	1.70	11.35		
		Average.		1.50	0.27	1.93	12.95	1.92	11.03	
Romeo										
A 3718	Superior Acid Phosphate.	Romeo.	{ P. }				18.90	1.06	16.00	
A 3749	Superior Acid Phosphate.	Davis.					17.60	0.38	17.22	
A 4019	Superior Acid Phosphate.	Grand Rapids.				18.93	1.06	17.87		
A 4005	Superior Acid Phosphate.	Jamestown.				19.05	1.02	18.03		
A 4587*	Superior Acid Phosphate.	Quincy.				18.10	1.42	16.68		
		Average.					18.52	0.99	17.53	
Triaton Fertilizer.										
A 3784	Triaton Fertilizer.	Homer.	{ P. }	1.24	0.30	1.66	14.60	1.30	13.30	12.00
A 4090	Triaton Fertilizer.	Grand Rapids.		1.20	0.38	1.77	16.20	1.30	13.90	1.30
A 4077	Triaton Fertilizer.	Coopersville.	1.29	0.39	1.86	15.45	1.34	14.21	1.24	
A 4302	Triaton Fertilizer.	Jamestown.	1.36	0.34	1.66	11.40	1.12	13.06	1.12	
		Average.	1.20	0.36	1.76	11.40	1.34	13.06	13.06	

A 3978	Use More Fertilizer.....	Coopersville.....	{ G.† F.†						14.35	0.08	18.00 13.37	2.00 1.58
A 4453*	Wolverine Phosphate.....	Romulus.....	{ G.† F.†						12.05	0.68	10.00 11.37	
A 4170*	Wolverine Phosphate.....	Melvin.....	{ G.† F.†						12.30	0.58	11.72	
	Average.....	Average.....							12.17	0.63	11.54	
A 3835	Michigan Carbon Works Homestead Brands Bean Fertilizer 1916.....	Fennville.....	{ G.† F.†	1.31	0.25	0.21	1.65 1.77	10.75	1.18	8.00	8.00	1.02
A 3757	Bialode Fertilizer.....	Blissfield.....	{ G.† F.†	0.63	0.11	0.21	0.88	12.55	1.18	10.00	10.00	1.06
A 3793	Bialode Fertilizer.....	Homerville.....	{ G.† F.†	0.68	0.14	0.15	0.97	12.35	1.06	11.27	11.37	1.01
A 4035	Bialode Fertilizer.....	Coopersville.....	{ G.† F.†	0.70	0.14	0.18	1.02	13.30	1.66	11.64	11.64	1.06
	Average.....	Average.....		0.67	0.13	0.18	0.98	12.73	1.30	11.43	11.43	1.04
A 3758	Bone Black Fertilizer with Potash.....	Blissfield.....	{ G.† F.†	1.24	0.21	0.21	1.66	10.45	1.28	8.00	8.00	1.01
A 3785	Bone Black Fertilizer with Potash.....	Homerville.....	{ G.† F.†	0.98	0.45	0.31	1.74	10.65	1.64	9.91	9.91	0.99
A 3858	Bone Black Fertilizer with Potash.....	Hastings.....	{ G.† F.†	1.23	0.33	0.18	1.74	10.55	2.00	8.55	8.55	1.38
A 4257	Bone Black Fertilizer with Potash.....	Lansing.....	{ G.† F.†	1.30	0.05	0.26	1.61	10.55	0.36	10.19	10.19	1.55
A 4536*	Bone Black Fertilizer with Potash.....	Utica.....	{ G.† F.†	0.86	0.58	0.43	1.87	10.20	1.18	9.02	9.02	1.09
	Average.....	Average.....		1.12	0.32	0.28	1.72	10.48	1.29	9.19	9.19	1.20
A 4501	Bone Black Sugar Beet.....	Reese.....	{ G.† F.†	0.59	0.14	0.20	0.82	10.65	1.34	8.00	8.00	1.44
A 3837	Grain Fertilizer.....	Pennville.....	{ G.† F.†	0.92	0.57	0.30	1.66	14.60	1.68	12.92	12.92	3.32
A 4437	Grain Fertilizer.....	Holly.....	{ G.† F.†	1.22	0.28	0.20	1.70	14.00	0.72	13.28	13.28	3.01
	Average.....	Average.....		1.07	0.42	0.25	1.74	14.30	1.20	13.10	13.10	3.16
A 3759	High Grade Garden & Vegetable Fertilizer.....	Blissfield.....	{ G.† F.†	1.27	0.21	0.25	1.65	10.20	0.52	8.00	8.00	5.00
A 4123*	High Grade Garden & Vegetable Fertilizer.....	Caldonia.....	{ G.† F.†	0.98	0.34	0.36	1.68	10.56	1.30	9.68	9.68	4.84
A 4671*	High Grade Garden & Vegetable Fertilizer.....	Henderson.....	{ G.† F.†	1.11	0.35	0.30	1.76	10.10	1.14	9.25	9.25	4.92
	Average.....	Average.....		1.12	0.30	0.30	1.72	10.28	0.99	9.29	9.29	5.04
A 3759	Special Potash Fertilizer.....	Blissfield.....	{ G.† F.†	0.67	0.07	0.14	0.82	9.65	1.10	8.00	8.00	2.26
A 3776	Special Potash Fertilizer.....	Saline.....	{ G.† F.†	0.67	0.14	0.13	0.88	10.70	1.16	8.55	8.55	2.26
A 3800	Special Potash Fertilizer.....	Pennville.....	{ G.† F.†	0.67	0.07	0.17	0.87	9.65	1.26	8.36	8.36	2.06
A 3836	Special Potash Fertilizer.....	Pennville.....	{ G.† F.†	0.53	0.13	0.25	0.91	9.05	0.72	8.23	8.23	2.39
A 4561*	Special Potash Fertilizer.....	Hartland.....	{ G.† F.†	0.50	0.06	0.31	0.87	10.30	0.78	9.52	9.52	2.16
	Average.....	Average.....		0.60	0.09	0.20	0.89	9.97	1.00	8.97	8.97	2.17

Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash	
			As Soluble	As Active Insoluble	As Inactive Insoluble	Total	Total	Insoluble	Available	Water Soluble	
A 4383	American Agricultural Chemical Co.—Cont. Michigan Carbon Works Homestead Brands—Cont. Sugar Beet Fertilizer 1916.....	Ottawa Lake..... { G† P†	0.64	0.17	0.14	0.88 0.95	10.40	1.23	9.00 9.17	1.00 1.15	
A 4397	Michigan State Grange Brands All Crops Special Fertilizer 1916.....	Temperance..... { G† P†	0.53	0.14	0.17	0.84 0.88	10.25	0.86	8.00 9.39	1.00 1.04	
A 4410 A 4452	Ammoniated Bone and Potash..... Ammoniated Bone and Potash.....	Monroe..... { G† P†	0.70 0.65	0.15 0.18	0.19 0.19	0.84 1.02	12.80 12.75	1.50 1.12	10.00 11.63	1.00 1.14	
A 4394	Corn and Oats Fertilizer.....	Temperance..... { G† P†	1.28	0.24	0.26	1.65 1.78	12.15	1.72	10.00 10.43	.....
A 4411	High Grade Phosphate and Potash.....	Monroe..... { G† P†	.....	.....	.....	.....	13.30	0.62	18.00 12.68	2.00 2.13	
A 4171*	IX Fertilizer.....	Brown City..... { G† P†	0.42	0.17	0.22	0.88 0.81	12.45	1.04	10.00 11.41	.....
A 4395 A 4398	Wheat Fertilizer Extra..... Wheat Fertilizer Extra.....	Erie..... { G† P†	.....	.....	.....	.....	19.30 18.08	1.22 1.40	16.00 18.40	.....
A 4396	Wheat Fertilizer No. 1..... Niagara Brands Acid Phosphate 10% Bean Grower	Temperance..... { G† P†	.....	.....	.....	.....	19.55	1.31	18.24	.....
							16.60	0.58	14.00 16.02	.....
									10.00	.....

FERTILIZER ANALYSES

[illegible]

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

[illegible]

A 3728	Potash Manure 1916.	Plymouth.	{ G. P. }	0.70	0.11	0.16	0.89	10.20	1.20	8.00	1.00
A 3743	Potash Manure 1916.	Lenox.	{ G. P. }	0.72	0.10	0.19	0.97	10.65	1.48	9.00	1.14
A 3749	Potash Manure 1916.	Adrian.	{ G. P. }	0.72	0.09	0.16	0.97	9.85	1.36	8.17	1.20
A 4048*	Potash Manure 1916.	Richmond.	{ G. P. }	0.53	0.16	0.19	0.95	10.00	0.86	9.14	1.09
	Average.			0.67	0.12	0.17	0.96	10.20	1.22	8.98	1.14
A 3772	Quick Acting Phosphate.	Adrian.	{ G. P. }					11.10	0.36	10.00	
A 4664*	Quick Acting Phosphate.	Adrian.	{ G. P. }					11.60	0.38	10.74	
	Average.							11.35	0.37	10.98	
A 4295	Special Dissolved Amophos.	Williamston.	{ G. P. }	1.42	0.21	0.17	1.65	12.45	1.36	10.00	
							1.80			11.09	
A 4361	Special Grain Fertilizer.	Swartz Creek.	{ G. P. }	1.37	0.22	0.15	1.65	13.35	0.64	18.00	5.00
A 4626*	Special Grain Fertilizer.	Saline.	{ G. P. }	1.13	0.33	0.25	1.71	14.05	1.68	12.71	3.39
	Average.			1.25	0.27	0.20	1.72	13.70	1.16	12.54	3.63
A 4359	Square Deal Phosphate.	Swartz Creek.	{ G. P. }					15.80	0.26	14.00	
										15.54	
A 4343	Sugar Beet Fertilizer 1916.	Oakley.	{ G. P. }	0.67	0.12	0.16	0.89	9.78	0.86	9.00	1.00
							0.95			8.92	1.30
A 4417	XXX Fertilizer.	Petersburg.	{ G. P. }					13.75	0.68	18.00	5.00
										13.07	2.10
Packers Boar's Head Brands											
A 3970	Ammoniated Bone Phosphate and Potash.	North Star.	{ G. P. }	0.63	0.17	0.15	0.82	11.90	1.32	10.00	1.00
A 4509	Ammoniated Bone Phosphate and Potash.	Wyandotte.	{ G. P. }	0.40	0.17	0.22	0.79	12.10	1.16	10.58	1.13
	Average.			0.51	0.17	0.19	0.87	12.00	1.24	10.76	1.16
A 3953	Best Grain Fertilizer.	Holland.	{ G. P. }	1.04	0.46	0.27	1.65	14.50	1.28	18.00	5.00
A 4483	Best Grain Fertilizer.	Holland.	{ G. P. }	1.39	0.19	0.15	1.77	14.25	0.78	13.29	3.24
A 4657*	Best Grain Fertilizer.	Ronulus.	{ G. P. }	1.17	0.31	0.22	1.70	14.00	1.54	13.47	3.24
	Average.			1.20	0.32	0.21	1.73	14.25	1.20	12.46	3.45
										13.05	3.23
A 4472	Corn and Wheat Grower.	Clarkston.	{ G. P. }	1.08	0.43	0.30	1.65	10.95	1.24	9.71	5.00
							1.81			2.33	
A 3745	Dissolved Phosphate and Potash.	Lenox.	{ G. P. }					12.85	1.58	10.00	5.00
										11.27	2.02

Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
	American Agricultural Chemical Co.—Cont.									
	Gilt Edge Phosphate.....	G.t.								
A 4473	High Grade Vegetable Fertilizer.....	Clarkston..... { G.t. P.t.	0.94	0.43	0.36	1.65	11.05	1.20	14.00	5.00 5.25
A 3744	New Compound.....	Lenox..... { G.t. P.t.	0.52	0.23	0.19	0.88	12.65	1.62	10.00	
A 3880	New Compound.....	Harlem.....	0.86	0.21	0.13	0.90	12.80	1.86	11.03	
A 4107*	New Compound.....	Zealand.....	0.55	0.30	0.22	1.07	13.20	1.34	11.86	
	Average.....		0.54	0.25	0.18	0.97	12.88	1.61	11.27	
A 4337	New Compound and Potash Fertilizer.....	Bancroft..... { G.t. P.t.	0.71	0.11	0.16	0.88	10.00	1.08	8.00	8.00 2.10
A 4368	16% Phosphate.....	Lennon..... { G.t. P.t.					17.90	0.52	16.00	
A 3882	16% Phosphate.....	Harlem.....					18.80	1.12	17.38	
	Average.....						18.35	0.82	17.53	
A 4177*	Phosphatah Fertilizer.....	Kent City..... { G.t. P.t.					13.60	0.44	18.00	8.00 2.10
	Potash Phosphate Fertilizer.....								13.16	
	Soluble Phosphate.....								18.00	
A 3952	Success Fertilizer.....	Holland..... { G.t. P.t.	1.36	0.36	0.13	1.65	15.10	1.28	18.00	
A 4106*	Success Fertilizer.....	Zealand.....	0.78	0.58	0.40	1.76	15.20	1.26	13.82	
	Average.....		1.07	0.47	0.27	1.81	15.15	1.27	13.88	
4632*	Sugar Beet Grower 1918.....	Willis..... { G.t. P.t.	0.65	0.09	0.13	0.87	10.00	0.82	9.00	1.00 1.20

A 4338	Sure Growth Potash Manure.....	{G↑ P↑}	0.53	0.12	0.23	0.88	9.30	0.92	8.00	5.00
A 4347	Sure Growth Potash Manure.....	{G↑ P↑}	0.54	0.11	0.23	0.88	9.35	0.94	8.38	3.40
	Average.....		0.53	0.12	0.23	0.88	9.57	0.78	8.79	3.17
A 3746	Sure Growth Potash Manure 1916.....	{G↑ P↑}	0.66	0.10	0.18	0.88	10.65	1.46	8.00	1.00
A 3881	Sure Growth Potash Manure 1916.....	{G↑ P↑}	0.56	0.15	0.22	0.93	10.40	1.18	9.19	1.23
	Average.....		0.61	0.13	0.20	0.94	10.53	1.32	9.21	1.13
A 4494	2 and 10 Compound.....	{G↑ P↑}	1.35	0.31	0.21	1.65	12.40	1.68	10.00	.....
	World of Good Superphosphate with Potash.....	{G↑ P↑}				1.65			10.72	.....
	Armour Fertilizer Works Chicago, Ill.					1.65			8.00	1.00
A 3843	Ammoniated Phosphate No. 2.....	{G↑ P↑}	1.04	0.42	0.14	1.66	13.20	2.34	10.00	.....
A 4360	Cereal Phosphate.....	{G↑ P↑}				1.60	11.60	1.10	10.00	.....
A 3847	Grain Grower.....	{G↑ P↑}	0.51	0.54	0.43	1.65	11.05	1.84	8.00	2.00
A 4012	Grain Grower.....	{G↑ P↑}	0.50	0.44	0.30	1.63	12.35	2.37	9.21	2.79
A 4072	Grain Grower.....	{G↑ P↑}	0.76	0.47	0.36	1.59	11.45	2.42	10.00	2.47
A 4206	Grain Grower.....	{G↑ P↑}	0.66	0.42	0.25	1.53	9.83	1.86	9.33	2.42
	Average.....		0.71	0.47	0.33	1.61	11.17	2.02	9.15	2.34
A 4078	Ksinit.....	{G↑ P↑}							14.00	14.32
	Decatut.....									
A 3747	Michigan Special.....	{G↑ P↑}	0.34	0.22	0.24	0.88	10.55	1.22	8.00	1.00
A 3763	Michigan Special.....	{G↑ P↑}	0.33	0.24	0.24	0.81	9.80	1.24	9.33	1.10
A 4002	Michigan Special.....	{G↑ P↑}	0.35	0.25	0.15	0.75	11.15	1.36	8.56	0.68
A 4016	Michigan Special.....	{G↑ P↑}	0.39	0.31	0.21	0.91	11.35	1.62	9.79	0.93
A 4529*	Michigan Special.....	{G↑ P↑}	0.43	0.28	0.13	0.84	8.93	1.14	7.73	2.21
	Average.....		0.37	0.26	0.19	0.82	10.36	1.32	9.04	1.24
A 4028	Phosphate and Potash Special.....	{G↑ P↑}					11.70	0.64	10.00	1.00
	Coopersville.....								11.06	0.68
A 3901	Sheep Manure.....	{G↑ P↑}	0.16	0.45	1.01	1.44	1.15	0.34	1.00	1.00
	Portage.....					1.62			0.81	3.18

*Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Organic	As Inactive Organic	Total	Total	Insoluble		Available
Armour Fertilizer Works—Cont.										
A 4209	Special Grain Grower	Quincy	0.90	0.47	0.27	1.65	10.00	1.96	8.00	1.00
A 4349	Special Grain Grower	Flushing	0.78	0.51	0.37	1.66	10.55	2.58	7.97	0.99
		Average	0.84	0.49	0.32	1.65	10.27	2.27	8.00	1.22
A 4017	Standard	Grand Rapids	0.46	0.24	0.14	0.84	13.33	5.68	7.65	5.00
A 4030	Standard	Coopersville	0.38	0.21	0.18	0.77	13.05	6.00	8.05	2.83
A 4073	Standard	Detroit	0.44	0.30	0.20	0.94	10.80	1.48	9.32	1.66
A 4229	Standard	Ann Arbor	0.67	0.26	0.15	1.08	12.70	4.62	8.08	2.44
		Average	0.49	0.24	0.17	0.90	12.47	4.19	8.28	2.31
A 3846	Star Phosphate	Byron Center					13.00	0.64	14.00	
A 4421	Star Phosphate	Deerfield					16.15	0.14	16.01	
		Average					14.57	0.39	14.18	
A 3848	Wheat, Corn and Oats Special	Plainwell	0.31	0.24	0.20	0.89	8.45	1.04	7.40	1.00
A 4029	Wheat, Corn and Oats Special	Coopersville	0.41	0.24	0.15	0.80	9.90	1.48	8.42	1.15
A 4210	Wheat, Corn and Oats Special	Quincy	0.35	0.29	0.17	0.81	8.80	1.40	7.40	1.03
A 4360	Wheat, Corn and Oats Special	Flushing	0.46	0.34	0.18	0.98	9.50	1.68	7.82	0.99
A 4560*	Wheat, Corn and Oats Special	Disco	0.55	0.19	0.06	0.80	8.35	0.60	7.75	0.91
		Average	0.41	0.26	0.15	0.82	9.00	1.24	7.76	1.01
A 3845	1-10 Fertilizer	Byron Center	0.36	0.31	0.17	0.84	11.55	1.40	10.15	
A 3932	1-10 Fertilizer	Canovia	0.55	0.30	0.15	1.00	11.60	2.30	9.30	
A 4530*	1-10 Fertilizer	Utica	0.44	0.28	0.11	0.83	11.05	1.06	9.99	
		Average	0.45	0.30	0.14	0.89	11.36	1.55	9.81	

A 4050	1-12-1 Fertilizer.....	{G† F†}	0.43	0.23	0.14	0.89	13.50	1.10	19.00	1.00
A 4204	1-12-1 Fertilizer.....		0.45	0.30	0.18	0.83	13.50	1.10	12.40	0.97
	Average.....		0.44	0.26	0.16	0.86	13.83	1.10	12.73	0.85
Big Crop Brands										
A 3748	16% Acid Phosphate.....	{G† F†}					18.15	0.68	19.00	
A 4027	16% Acid Phosphate.....						18.80	0.42	17.47	
A 4038	16% Acid Phosphate.....						18.70	1.00	18.98	
A 4065	16% Acid Phosphate.....						18.85	0.80	17.70	
A 4205	16% Acid Phosphate.....						17.80	0.14	18.05	
	Average.....						18.46	0.61	17.85	
A 4001	Bone Meal.....	{G† F†}	0.85	0.84	0.54	1.66	27.00			
A 4015	Bone Meal.....		0.91	0.92	0.44	2.35	27.40			
A 4230	Bone Meal.....		1.01	1.14	0.60	2.75	28.40			
	Average.....		0.96	0.97	0.52	2.46	27.80			
Half Bone Meal Half Acid Phosphate										
A 3860	2-12 Fertilizer.....	{G† F†}	0.53	0.67	0.35	1.65	16.08	2.68	19.40	
A 4207	2-12 Fertilizer.....		0.79	0.57	0.24	1.60	14.45	2.22	13.32	
	Average.....		0.66	0.62	0.30	1.68	15.26	2.44	12.82	
A 3764	12-2 Brand.....	{G† F†}					13.45	0.40	19.00	1.00
A 3859	12-2 Brand.....						13.50	1.00	13.05	0.97
	Average.....						13.47	0.70	12.77	1.05
A 3849	12-4 Brand.....	{G† F†}					13.25	0.74	19.00	1.00
A 4031	12-4 Brand.....						13.65	0.74	12.51	0.97
A 4208	12-4 Brand.....						14.25	0.87	12.81	0.91
A 4277	12-4 Brand.....						13.25	0.82	11.58	0.90
	Average.....						13.57	0.82	12.45	0.94
A 3844	2-10-4 Brand.....	{G† F†}	0.93	0.55	0.47	1.65	12.10	1.29	12.28	0.93
A 4013	2-10-4 Brand.....		0.81	0.48	0.35	1.95	14.20	2.38	10.00	0.99
A 4071	2-10-4 Brand.....		0.79	0.45	0.36	1.60	13.15	2.48	9.73	0.96
A 4276	2-10-4 Brand.....		0.93	0.59	0.38	1.90	12.50	2.08	11.72	0.96
	Average.....		0.86	0.52	0.39	1.77	12.99	2.31	10.23	0.99

†Abbreviations for Guaranteed and Found.

*Full Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble
Armour Fertilizer Works—Cont.										
Big Crop Brands—Cont.										
A 4014	2-12-2 Brand.....	{ G† F†	1.01	0.46	0.31	1.66	16.05	2.46	13.59	2.00
A 4275	2-12-2 Brand.....		0.92	0.54	0.30	1.76	15.30	2.32	12.98	2.04
A 4203	2-12-2 Brand.....		0.71	0.57	0.36	1.64	15.20	2.24	12.96	2.11
	Average.....		0.88	0.52	0.32	1.72	15.51	2.34	13.17	2.05
Tuscarora Brands										
A 3961	Acid Phosphate.....	{ G† F†					16.60	0.54	14.00	
	10% Phosphate.....	G†							16.06	
	1-10 Fertilizer.....	G†				0.88			10.00	
	Potash and Phosphate.....	G†							10.00	1.00
A 3960	Special Corn, Wheat and Bean Grower.....	{ G† F†	0.47	0.32	0.19	0.88	9.90	1.70	8.00	1.00
	Special Standard.....	G†				0.98			8.20	1.18
	Standard.....	G†				1.65			8.00	1.00
	Tankage and Phosphate.....	G†				1.65			8.00	2.00
The Barrett Company, New York, N. Y.										
A 3277	Arcadian Sulphate of Ammonia.....	{ G† F†				20.75				
A 4101	Arcadian Sulphate of Ammonia.....					20.93				
A 4251	Arcadian Sulphate of Ammonia.....					21.04				
	Average.....					21.02				

FERTILIZER ANALYSES

[illegible]

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Calumet Fertilizer Co.—Cont.										
A 4389	Coburn's Special with Potash.....	Lula. { G. P.	0.29	0.18	0.19	0.60 0.66	10.40	1.14	8.00 9.26	0.50 0.54
A 4652*	Corn and Wheat Special.....	Mason. { G. P.	1.39	0.25	0.12	1.65 1.76	11.90	1.14	10.00 10.76	2.02
A 4094	Extra Ammoniated Bone Phosphate.....	Sawyer. { G. P.	1.32	0.21	0.11	1.64 1.68	13.40	1.02	12.00 12.38	.....
A 3871	Half Eight Three.....	Sunfield. { G. P.	0.15	0.10	0.14	0.41 0.36	8.65	0.93	7.73	5.00
A 4364	Half Eight Three.....	Lennon.....	0.16	0.10	0.15	0.41	9.20	0.52	8.68	3.07
A 4110*	Half Eight Three.....	Zeeland.....	0.18	0.08	0.18	0.42	9.20	0.98	8.22	3.03
A 4550*	Half Eight Three.....	Richmond.....	0.22	0.08	0.16	0.46	9.05	1.00	8.05	3.06
	Average.....	Average.....	0.18	0.08	0.16	0.42	9.02	0.86	8.16	3.07
	Half Seven Ten.....	G. P.	.....	.....	.....	0.41	.....	.....	7.00	10.00
A 4483	Half Ten Two.....	Memphis. { G. P.	0.24	0.08	0.14	0.46	11.95	1.30	10.00 10.65	2.21
A 4688*	Half Ten Two.....	Charlotte.....	0.20	0.09	0.13	0.42	11.05	0.86	10.19	2.11
A 4689*	Half Ten Two.....	Olivet.....	0.24	0.16	0.22	0.62	10.90	0.82	10.08	2.04
	Average.....	Average.....	0.23	0.11	0.16	0.50	11.30	0.99	10.31	2.12
A 4096	One Half Thirteen One.....	Sawyer. { G. P.	0.25	0.10	0.17	0.41 0.52	17.35	4.12	13.00 13.23	1.00
A 4284	One Half Thirteen One.....	Mason.....	0.21	0.09	0.15	0.45	15.88	3.09	12.49	1.07
	Average.....	Average.....	0.23	0.09	0.16	0.48	16.46	3.60	12.86	1.03
	High Grade Manure.....	G. P.	.....	.....	.....	1.85	.....	.....	9.00	1.00
4654*	High Grade Tobacco and Truck Grower.....	Mason. { G. P.	2.15	0.43	0.02	2.60 2.47	12.30	2.26	10.00 10.04	4.00 3.79

A 4282 A 4459	Onion and Beet Grower. Onion and Beet Grower.	{ G. P. }	0.45 0.42	0.18 0.19	0.35 0.23	0.83 0.98 0.84	9.80 9.15	1.62 1.79	8.00 8.18 7.86	5.00 3.24 2.86
	Average.		0.43	0.19	0.29	0.91	9.47	1.70	7.77	3.05
A 4283 A 4387 A 4656*	Onion and Potato Grower. Onion and Potato Grower. Onion and Potato Grower.	{ G. P. }	1.04 1.04 1.40	0.16 0.19 0.16	0.12 0.27 0.22	1.68 1.80 1.78	10.75 9.70 10.15	1.78 2.03 1.92	8.00 8.97 7.67 8.23	8.00 7.74 7.00 8.15
	Average.		1.16	0.17	0.20	1.53	10.20	1.91	8.29	7.68
A 3845 A 4354 A 4365 A 4415 A 4477 A 4568*	Phosphate and Potash. Phosphate and Potash. Phosphate and Potash. Phosphate and Potash. Phosphate and Potash. Phosphate and Potash.	{ G. P. }					11.65 11.40 10.98 11.28 11.95 10.70	1.38 0.62 1.55 1.96 1.20 0.68	10.00 10.27 10.78 9.43 9.33 10.02	2.00 1.78 2.01 1.97 2.21 1.80
	Average.						11.32	1.23	10.09	1.89
A 4092 A 4464	Special Crop Grower. Special Crop Grower.	{ G. P. }	0.11 0.17	0.12 0.12	0.20 0.12	0.41 0.43 0.42	13.50 12.80	1.50 0.54	18.00 12.00 12.26	
	Average.		0.14	0.12	0.16	0.42	13.15	1.02	12.13	
A 4285	Special Pure Bone Meal.	{ G. P. }	0.17	0.41	0.22	0.89 0.80	50.00 37.00			
A 3943 A 4366 A 4675*	Ten Four. Ten Four. Ten Four.	{ G. P. }					11.50 10.10 11.75	1.24 0.26 1.30	10.00 10.26 9.84 10.45	4.00 2.84 2.84 3.54
	Average.						11.11	0.93	10.18	3.67
A 4479 A 4142* A 4656*	Ten Ten Hummer. Ten Ten Hummer. Ten Ten Hummer.	{ G. P. }					12.45 12.88 12.35	3.19 3.45 2.18	10.00 9.26 9.43 10.17	10.00 10.41 10.06 10.20
	Average.						12.56	2.94	9.63	10.23
A 4182* A 4653*	Two Eight Two. Two Eight Two.	{ G. P. }	1.01 1.06	0.21 0.24	0.38 0.36	1.68 1.66	9.25 9.45	1.06 1.14	8.00 8.19 8.31	8.00 2.00 2.00
	Average.		1.03	0.23	0.37	1.63	9.35	1.10	8.25	2.00
	Two Twelve Two.	G.				1.64			18.00	2.00

Abbreviations for Guaranteed and Pounded
Fall Samples.

A 3941	Goodwill Guano.....	{ G†	0.42	0.14	0.16	0.80	9.85	1.50	8.00	1.00
A 4392	Goodwill Guano.....	{ F†	0.38	0.21	0.18	0.72	10.00	1.72	8.35	1.34
	Average.....		0.40	0.17	0.17	0.74	9.92	1.61	8.31	1.17
A 3946	Half & Half Bone and Phosphate.....	{ G†	0.57	0.45	0.22	1.80	21.02	9.75	15.00	.....
A 4470	Immense Guano.....	{ F†	1.39	0.22	0.19	1.80	12.65	1.26	10.00	4.00
A 3947	10-8 Phosphate and Potash.....	{ G†	.....	.....	.....	.....	12.05	1.06	10.00	8.00
A 4391	12-2 Phosphate and Potash.....	{ F†	.....	.....	.....	.....	13.90	1.83	12.07	8.00
A 4469	12-4 Phosphate and Potash.....	{ G†	.....	.....	.....	.....	15.15	2.66	12.40	4.40
	Prize Guano.....	{ F†	.....	.....	.....	1.80	.....	.....	8.00	6.00
	Special Fish Guano.....	{ G†	.....	.....	.....	0.80	.....	.....	11.00	8.00
	Success Guano.....	{ G†	.....	.....	.....	8.40	.....	.....	10.00	8.00
A 3707	Sunrise Guano.....	{ F†	1.04	0.22	0.28	1.80	13.10	1.52	10.00	8.00
	Darling & Company Chicago, Ill.					1.54	.....	.....	11.58	2.12
A 4486	16% Acid Phosphate.....	{ G†	.....	.....	.....	.....	17.80	0.68	16.00	.....
A 3983*	16% Acid Phosphate.....	{ F†	.....	.....	.....	.....	16.80	0.74	16.03	.....
A 3987*	16% Acid Phosphate.....		.....	.....	.....	.....	16.20	0.82	15.88	.....
	Brighton.....		.....	.....	.....	.....	16.93	0.75	16.18	.....
	Burnip Corners.....		.....	.....	.....	.....	.....	.....	.....	.....
	Grand Rapids.....		.....	.....	.....	.....	.....	.....	.....	.....
A 4010	Big Harvest Brand.....	{ G†	0.59	0.18	0.24	0.88	10.40	1.24	8.00	8.00
A 4225	Big Harvest Brand.....	{ F†	0.60	0.19	0.20	1.01	10.60	1.20	9.16	3.20
A 4328	Big Harvest Brand.....		0.74	0.19	0.18	0.99	9.20	1.24	9.40	3.03
A 4348	Big Harvest Brand.....		0.51	0.20	0.17	1.11	12.65	1.14	7.96	3.36
A 3987*	Big Harvest Brand.....		0.79	0.19	0.10	0.88	11.00	2.26	11.51	8.83
A 3984*	Big Harvest Brand.....		0.80	0.21	0.15	1.08	11.15	2.24	8.74	3.00
A 4567*	Big Harvest Brand.....		0.82	0.18	0.10	1.10	10.85	1.68	9.17	3.01
	Average.....		0.69	0.19	0.16	1.04	10.83	1.57	9.26	3.02

†Abbreviations for Guaranteed and Found.
*Fall Samples.

A 3985*	Grain Grower.....	0.63	0.28	0.11	1.02	11.30	0.92	10.38	1.16
A 4519*	Grain Grower.....	0.55	0.23	0.08	0.86	13.20	1.08	12.12	1.00
A 4533*	Grain Grower.....	0.83	0.27	0.07	1.17	11.80	1.74	10.06	1.36
	Average.....	0.60	0.23	0.14	0.97	11.92	1.28	10.94	1.14
A 3987	Little Giant.....	{ G.† F.†			0.88			10.00	
A 4562*	Little Giant.....		0.39	0.24	0.21	13.85	1.28	12.57	
A 4566*	Little Giant.....		0.56	0.35	0.11	12.70	1.16	10.94	
	Grand Blanc.....		0.48	0.34	0.08	13.45	2.98	10.47	
	Average.....	0.47	0.31	0.14	0.92	13.34	2.01	11.33	
A 4025	Pulverized Sheep Manure.....	{ G.† F.†			0.06	1.00			1.00
A 4079	Pulverized Sheep Manure.....		0.70	0.42	1.07	2.19	0.66	1.74	1.37
	Niles.....		0.48	0.43	1.09	2.00	0.12	1.73	3.60
	Average.....		0.59	0.43	1.08	2.10	0.39	1.74	2.49
A 4011	Pure Ground Bone.....	{ G.† F.†			1.85	88.00			
A 4103*	Pure Ground Bone.....		0.96	1.00	0.57	28.50			
	Sparta.....		0.86	1.08	0.63	28.10			
	Average.....		0.83	1.02	0.61	28.35			
A 3930	Sure Winner.....	{ G.† F.†			0.82	13.10	1.74	10.00	0.50
A 4434	Sure Winner.....		0.58	0.24	0.22	1.84	1.74	11.96	0.76
A 4462	Sure Winner.....		0.43	0.23	0.25	0.91	1.76	11.96	0.71
A 3986*	Sure Winner.....		0.45	0.21	0.21	0.87	1.50	11.85	0.83
A 4341*	Sure Winner.....		0.51	0.25	0.17	0.93	2.00	11.80	0.74
	Burnips Corners.....		0.52	0.24	0.21	0.97	2.04	10.91	0.83
	Utica.....		0.50	0.23	0.21	0.94	1.81	11.40	0.77
	Average.....		0.50	0.23	0.21	0.94	1.81	11.40	0.77
A 4113*	A-1 Fertilizer.....	{ G.† F.†			0.88	13.10	0.94	12.00	
	Conklin.....		0.62	0.21	0.04	0.87		12.16	
A 4178*	A-J Formula.....	{ G.† F.†			1.66	11.75	1.46	10.00	
	Wayland.....		0.94	0.31	0.11	1.86		10.26	
A 3916	Alsatian Potash.....	{ G.† F.†							14.00
	Hartford.....								14.16

†Abbreviations for Guaranteed and Found.
*Fall Samples.

Federal Chemical Co.
Louisville, Ky.

A 4372	High Grade Fertilizer.....	Louisville.....	0.93	0.26	0.13	1.33	14.50	0.82	13.68
A 4601*	High Grade Fertilizer.....	Marshall.....	1.10	0.34	0.17	1.61	13.45	1.50	11.99
A 4687*	High Grade Fertilizer.....	Sheldon.....	1.10	0.38	0.08	1.56	14.80	1.00	13.80
	Average.....	Average.....	1.01	0.30	0.10	1.44	14.48	0.99	13.49
A 3762	High Grade Phosphate.....	Blissfield.....							16.00
A 4024	High Grade Phosphate.....	Grand Rapids.....					19.40	2.64	16.76
A 4062	High Grade Phosphate.....	Zeeland.....					18.90	0.46	18.44
A 4098	High Grade Phosphate.....	St. Joseph.....					18.50	1.34	17.16
A 3993*	High Grade Phosphate.....	Coopersville.....					18.75	2.04	16.71
A 4120*	High Grade Phosphate.....	Zeeland.....					19.10	0.86	18.24
A 4522*	High Grade Phosphate.....	Clinton.....					17.95	1.08	16.87
A 4529*	High Grade Phosphate.....	New Haven.....					18.35	0.76	17.59
A 4537*	High Grade Phosphate.....	Vernon.....					17.95	0.78	17.17
A 4572*	High Grade Phosphate.....	Average.....					18.25	0.76	17.49
							18.57	1.19	17.38
A 4172*	Liberty Grain Grower.....	Capac.....	0.21	0.12	0.09	0.41	16.45	2.78	13.67
A 4259	Loam Land Fertilizer.....	Clayton.....	1.28	0.20	0.20	1.66	13.13	2.01	12.00
A 4141*	Loam Land Fertilizer.....	Birch Run.....	0.56	0.13	0.12	0.81	13.50	1.36	11.15
A 4685*	Loam Land Fertilizer.....	Dearborn.....	1.12	0.17	0.05	1.34	13.50	0.90	12.60
	Average.....	Average.....	0.99	0.16	0.12	1.37	13.37	1.42	11.95
A 3724	Michigan Bean and Beet Special.....	Wayne.....	0.12	0.10	0.12	0.41	13.30	0.62	11.00
A 4260	Michigan Bean and Beet Special.....	Clayton.....	0.28	0.10	0.12	0.34	12.56	0.60	12.68
A 4375	Michigan Bean and Beet Special.....	Ridgeway.....	0.93	0.13	0.14	0.42	14.10	1.22	11.95
A 4108*	Michigan Bean and Beet Special.....	Zeeland.....	0.22	0.12	0.16	0.42	12.50	1.26	12.88
A 4122*	Michigan Bean and Beet Special.....	Zeeland.....	0.36	0.15	0.08	0.67	13.50	0.82	11.24
	Average.....	Average.....	0.38	0.12	0.11	0.61	13.15	0.90	12.45
							13.15	0.90	12.25
A 3878	Mid West High Grade Mixture.....	Lowell.....	1.62	0.07	0.17	1.65	10.55	0.85	10.00
A 3899*	Mid West High Grade Mixture.....	Kalamazoo.....	1.24	0.04	0.10	1.36	11.60	0.95	10.70
A 4000*	Mid West High Grade Mixture.....	Marshall.....	0.68	0.10	0.18	0.96	12.95	1.72	10.45
	Average.....	Average.....	1.18	0.07	0.15	1.40	11.70	1.17	11.23
							11.70	1.17	10.53
	Mogul Potash Fertilizer.....								8.00
	Nitro-Phosphate.....								8.00
									15.00

Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
Federal Chemical Co.—Cont.										
A 3761	Potash Special	Blissfield.....					11.40	0.72	10.00	2.00
A 3879	Potash Special	Lowell.....					12.85	0.84	12.01	3.75
A 4054	Potash Special	Zeeland.....					10.95	0.78	10.17	2.23
A 4245	Potash Special	Tecumseh.....					11.30	0.86	10.44	2.23
A 4109*	Potash Special	Zeeland.....					16.35	5.52	10.83	1.95
A 4121*	Potash Special	Zeeland.....					10.43	0.74	9.69	2.02
A 4539*	Potash Special	New Haven.....					10.85	0.85	10.00	1.86
A 4574*	Potash Special	Vernon.....					10.10	0.86	9.24	1.48
	Average.....						11.78	1.40	10.38	2.15
	Pure Bone.....					1.00	30.00			
A 4146*	Royal Phosphate.....	Imlay City.....					16.60	0.58	14.00	
									16.02	
A 4023	Special Manure.....	Grand Rapids.....	0.51	0.14	0.10	0.82	12.40	0.86	10.00	2.00
A 4376	Special Manure.....	Ridgeway.....	0.49	0.09	0.18	0.76	10.20	0.60	11.54	2.10
A 4573*	Special Manure.....	Vernon.....	0.67	0.13	0.08	0.88	11.10	0.72	9.60	2.95
									10.38	2.02
	Average.....		0.55	0.12	0.12	0.79	11.23	0.73	10.50	2.36
A 3725	Special Phosphate Mixture.....	Wayne.....					22.70	7.12	10.00	
A 3828	Special Phosphate Mixture.....	Coopersville.....					24.90	8.25	15.58	
A 4246	Special Phosphate Mixture.....	Tecumseh.....					24.25	10.80	16.65	
									13.45	
	Average.....						23.95	8.72	15.23	
A 4174*	Standard Crop and Tobacco Grower.....	Chesaning.....	0.63	0.09	0.09	0.82	9.30	0.64	8.00	4.00
									8.66	2.33
	Standard Meal Mixture.....					0.82	10.00			
A 3760	Standard Wheat and Corn Maker.....	Blissfield.....	0.17	0.12	0.10	0.41	12.70	1.26	11.60	0.60
A 4021	Standard Wheat and Corn Maker.....	Grand Rapids.....	0.23	0.14	0.13	0.50	16.20	7.77	11.44	0.61
									11.43	0.68

A 4066	Standard Wheat and Corn Maker.	Zealand.	0.19	0.13	0.07	0.39	13.00	1.16	11.84	0.52
A 4150*	Standard Wheat and Corn Maker.	Marlette.	0.24	0.11	0.07	0.42	13.30	0.88	12.42	0.62
		Average	0.21	0.12	0.09	0.43	14.55	2.77	11.78	0.61
A 3897	Wheat and Grain Special.	Wayland.	{ G.†			0.88			19.00	1.00
A 3898	Wheat and Grain Special.	Wayland.	0.40	0.09	0.30	0.79	13.90	0.90	13.00	1.02
A 3913*	Wheat and Grain Special.	Kalamazoo.	0.65	0.09	0.06	0.80	14.70	1.45	13.25	1.20
A 4133*	Wheat and Grain Special.	Hartford.	0.66	0.10	0.04	0.80	13.60	1.72	12.18	1.18
A 4133*	Wheat and Grain Special.	Vernonville.	0.61	0.12	0.08	0.81	15.80	4.40	12.40	1.55
A 4538*	Wheat and Grain Special.	New Haven.	0.68	0.14	0.11	0.93	12.33	0.86	11.47	1.30
		Average	0.60	0.11	0.12	0.83	14.33	1.87	12.46	1.25
A 4168*	10% Potash Fertilizer.	Ruth.	{ G.†						6.00	10.00
	1st Prize Formula.						12.50	5.50	7.00	8.06
						0.82			11.00	3.00
	The Fertile Chemical Co. Cleveland, Ohio									
	Nitro-Pertile.					8.00			3.00	3.00
	Lime-Pertile.						3.00			
	Gleaner Clearing House Assn., Grand Rapids, Mich.									
	14% Acid Phosphate.								14.00	
A 4683*	16% Acid Phosphate.	Swartz Creek.	{ G.†				17.65	0.20	16.00	
A 4680*	Ammonia and Phosphoric Acid.	Swartz Creek.	{ G.†	0.35	0.16	1.65	12.70	0.58	10.00	
			1.03			1.64			12.12	
A 4515	Bean and Corn Grower.	Bridgeport.	{ G.†	0.34	0.19	0.82	14.85	0.98	10.00	1.00
A 4678*	Bean and Corn Grower.	Swartz Creek.	{ G.†	0.51	0.13	0.81	11.65	0.34	13.87	0.90
			0.57	0.26	0.16	0.99	13.25	0.66	11.31	1.36
		Average				0.82			12.59	0.68
A 4514	General Grower.	Bridgeport.	{ G.†	0.37	0.22	0.82	9.90	1.20	8.00	1.00
A 4178*	General Grower.	Ionia.	0.43	0.24	0.09	1.02	8.70	0.85	8.70	1.00
A 4679*	General Grower.	Swartz Creek.	0.52	0.25	0.11	0.87	9.30	0.62	8.95	1.01
		Average	0.49	0.29	0.14	0.92	9.58	0.81	8.68	1.09
									8.77	1.03

†Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Cleaner Clearing House Assn.—Cont.										
A 4181*	Grain Grower.....	Ionla..... { G.† P.†	1.06	0.41	0.17	1.66	10.20	0.82	8.00	1.00
A 4681*	Grain Grower.....	Swartz Creek.....	0.99	0.43	0.22	1.64	12.50	0.70	11.80	0.93
	Average.....		1.04	0.42	0.20	1.66	11.35	0.76	10.59	1.00
A 4662*	Grain Special.....	Swartz Creek..... { G.† P.†	0.89	0.33	0.13	1.35	13.10	0.54	12.56	1.59
A 4677*	Phosphoric Acid and Potash.....	Swartz Creek..... { G.† P.†					11.35	0.35	10.00	2.00
A 4513	Wolverine Pride.....	Bridgeport..... { G.† P.†	0.48	0.29	0.20	0.88	9.15	0.94	8.21	1.96
A 4180	Wolverine Pride.....	Ionla.....	1.18	0.33	0.15	1.66	10.20	0.64	9.56	1.85
	Average.....		0.83	0.31	0.17	1.31	9.67	0.79	8.88	1.75
International Agricultural Corp., Buffalo, N. Y. Buffalo Brands										
A 3819	Acid and Potash.....	Grand Rapids..... { G.† P.†					14.90	2.56	10.00	4.00
A 3991*	Acid and Potash.....	Hudsonville.....					11.45	0.44	12.34	3.77
	Average.....						13.17	1.50	11.67	3.84
A 3923	Ammoniated Phosphate.....	Zeeland..... { G.† P.†	1.10	0.44	0.13	1.67	15.65	1.98	13.67	
A 4583*	Ammoniated Phosphate.....	Eaton Rapids.....	1.26	0.17	0.12	1.55	15.50	2.56	12.94	
	Average.....		1.18	0.30	0.13	1.61	15.57	2.27	13.30	

FERTILIZER ANALYSES

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A 4595*	Crop Producer.....	{G.†	1.11	0.38	1.60	13.25	0.68	18.00	\$ 00
A 4646*	Crop Producer.....	{F.†	1.43	0.10	1.83	16.00	2.70	12.57	2.02
	Average.....		1.27	0.24	1.75	14.62	1.69	12.93	2.01
A 4487	Dissolved Phosphate.....	{G.†				15.90	0.48	14.00	
	Port Huron.....	{F.†						15.42	
A 3821	Economy.....	{G.†	1.15	0.31	1.60	11.55	2.60	8.00	\$ 00
A 3939	Economy.....	{F.†	0.82	0.49	1.63	10.10	1.88	8.95	2.21
A 4597*	Economy.....		0.89	0.43	1.70	10.50	0.76	8.22	2.38
	Average.....		0.95	0.41	1.65	10.72	1.75	9.74	1.99
A 4502	Farmers Choice.....	{G.†	0.86	0.13	0.80	13.70	2.62	10.00	2.19
	Bach.....	{F.†			0.88			11.08	2.02
A 4967	General Favorite.....	{G.†	0.90	0.08	0.80	10.70	2.10	8.00	1.00
A 4436	General Favorite.....	{F.†	0.41	0.09	1.05	11.50	3.00	8.60	1.10
A 4466	General Favorite.....		0.83	0.08	0.99	11.20	2.40	8.50	1.03
A 3990*	General Favorite.....		0.21	0.39	0.97	9.26	0.46	8.80	1.27
A 4562*	General Favorite.....		0.60	0.04	0.87	9.95	1.20	8.79	1.10
	Average.....		0.59	0.14	0.89	10.52	1.83	8.75	1.07
A 4542*	High Grade Acid Phosphate 18%.....	{G.†				19.50	0.40	8.69	1.11
	New Haven.....	{F.†						18.00	
A 3928	Ideal Wheat and Corn.....	{G.†	0.71	0.54	1.60	12.05	1.16	10.00	4.00
A 3940	Ideal Wheat and Corn.....	{F.†	0.74	0.39	1.47	11.80	0.98	10.89	4.00
A 4465	Ideal Wheat and Corn.....		1.23	0.21	1.40	13.05	1.80	10.82	4.29
A 4647*	Ideal Wheat and Corn.....		1.38	0.10	1.59	15.65	2.98	11.25	4.37
	Average.....		1.02	0.31	1.52	13.14	1.73	12.67	3.06
A 3822	Onion, Vegetable and Potato.....	{G.†	2.23	0.23	2.60	11.40	2.54	11.41	3.68
A 3989*	Onion, Vegetable and Potato.....	{F.†	0.27	0.33	0.94	9.35	0.48	8.86	3.68
	Average.....		1.30	0.28	1.83	10.37	1.61	8.86	3.54
A 3818	Phosphate and Potash.....	{G.†				16.20	2.94	18.00	\$ 00
A 3887	Phosphate and Potash.....					17.40	3.22	13.28	2.10
A 4440	Phosphate and Potash.....					13.50	0.40	14.08	1.66
A 4643*	Phosphate and Potash.....					15.20	1.42	13.10	1.96
	Average.....					15.55	1.99	13.78	2.02
								13.56	1.94

{Abbreviations for Guaranteed and Found.
*Fall Samples.

FERTILIZER ANALYSES

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A 3862	Complete.....	Charlotte.....	{ G:† F:†	1.42	0.27	0.12	1.81	11.30	3.00	8.00	2.02
A 3911	Complete.....	Dowsagac.....	{ G:† F:†	1.26	0.26	0.16	1.68	11.10	2.22	8.88	2.20
A 3925	Complete.....	Marshall.....	{ G:† F:†	0.80	0.45	0.39	1.64	9.60	1.52	8.08	1.94
A 4602*	Complete.....	Eaton Rapids.....	{ G:† F:†	1.16	0.29	0.12	1.56	13.00	4.43	8.57	2.17
	Average.....	Average.....		1.16	0.32	0.20	1.68	11.25	2.79	8.46	2.08
A 3909	Corn and Grain.....	Marcellus.....	{ G:† F:†	0.92	0.40	0.11	1.60	15.70	1.88	12.00	.....
A 3927	Corn and Grain.....	Marshall.....	{ G:† F:†	0.66	0.55	0.21	1.44	13.90	1.20	12.70	.....
A 4512	Corn and Grain.....	Parma.....	{ G:† F:†	1.01	0.43	0.15	1.59	16.30	1.78	13.52	.....
A 4640*	Corn and Grain.....	Maybee.....	{ G:† F:†	1.30	0.27	0.17	1.74	17.25	5.13	12.12	.....
	Average.....	Average.....		0.98	0.41	0.16	1.55	15.53	2.49	13.04	.....
A 4641*	Crop Producer.....	Maybee.....	{ G:† F:†	1.42	0.08	0.09	1.60	15.55	2.78	12.77	2.06
A 3824	General Crop.....	Zeeland.....	{ G:† F:†	0.79	0.30	0.16	0.80	14.50	2.00	10.00	.....
A 4603*	High Grade Acid Phosphate 18%.....	Eaton Rapids.....	{ G:† F:†	.....	.....	.....	.....	19.85	0.80	18.00	.....
A 3863	One Eight Four.....	Charlotte.....	{ G:† F:†	0.60	0.20	0.17	0.80	11.50	2.74	8.00	4.00
A 3865	One Ten Two.....	Charlotte.....	{ G:† F:†	0.71	0.17	0.11	0.80	13.35	3.04	10.00	2.83
A 4604*	One Ten Two.....	Eaton Rapids.....	{ G:† F:†	0.77	0.08	0.12	0.97	12.80	2.70	10.31	2.47
	Average.....	Average.....		0.74	0.13	0.12	0.98	13.07	2.87	10.20	2.65
A 3908	Potato and Vegetable.....	Marcellus.....	{ G:† F:†	1.85	0.34	0.12	2.60	10.00	1.66	8.00	5.00
A 4510	Potato and Vegetable.....	Parma.....	{ G:† F:†	1.51	0.26	0.20	2.31	10.65	2.57	8.34	3.27
	Average.....	Average.....		1.68	0.30	0.16	2.14	10.33	2.12	8.21	2.29
	Steamed Bone.....	.....	G:†	.....	.....	.....	0.80	29.00	.....	.....	.....
A 3907	Three Eight One.....	Marcellus.....	{ G:† F:†	1.88	0.25	0.07	2.60	11.35	2.68	8.00	1.00
A 3926	Three Eight One.....	Marshall.....	{ G:† F:†	0.85	0.96	0.33	2.14	9.85	1.00	8.67	1.09
	Average.....	Average.....		1.37	0.60	0.20	2.17	10.60	1.84	8.76	1.41

†Abbreviations for Guaranteed and Found.
*Full Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
International Agricultural Corp.—Cont.										
I. A. C. Brands—Cont.										
A 3929	Victory.....	{ F.†	0.35	0.33	0.27	0.80	9.30	0.78	8.00	1.00
A 4442	Victory.....		0.49	0.18	0.17	0.84	11.95	2.76	8.52	1.42
A 4463	Victory.....		0.72	0.06	0.06	0.83	11.15	2.98	8.17	0.97
	Average.....		0.52	0.19	0.16	0.87	10.80	2.17	8.63	1.15
A 3884	Wheat Special.....	{ F.†	0.35	0.45	0.15	0.80	22.00			
A 3910	Wheat Special.....		0.35	0.43	0.17	0.95	23.60			
	Average.....		0.35	0.44	0.16	0.95	23.80			
The Jarecki Chemical Co., Sandusky, Ohio										
A 4049	Acid Phosphate.....	{ F.†					17.90	0.46	16.00	
A 4242	Acid Phosphate.....						17.20	0.78	16.42	
A 4325	Acid Phosphate.....						17.40	1.12	16.28	
A 4327	Acid Phosphate.....						18.10	0.44	17.66	
	Average.....					17.65	0.70	16.95		
A 4048	Clay Soil Special.....	{ F.†	1.22	0.44	0.02	1.66	14.50	1.34	13.16	
A 4650*	Clay Soil Special.....		1.15	0.40	0.06	1.61	14.65	1.86	12.79	
	Average.....		1.18	0.42	0.04	1.64	14.57	1.60	12.97	
A 4386	C. O. D. Phosphate.....	{ F.†					16.10	0.92	14.00	
A 4420	C. O. D. Phosphate.....						16.55	1.24	15.31	
	Average.....					16.32	1.08	15.24		

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A 3854	Lake Erie Guano with Phosphate.....	{ G†	0.42	0.22	0.19	0.88	14.00	1.80	11.00	1.00
A 4240	Lake Erie Guano with Phosphate.....	{ F†	0.45	0.23	0.16	0.83	12.95	1.50	12.20	1.29
A 4270	Lake Erie Guano with Phosphate.....	.....	0.49	0.19	0.12	0.80	13.45	1.42	11.45	1.14
A 4307	Lake Erie Guano with Phosphate.....	.....	0.55	0.20	0.08	0.83	13.15	1.08	12.03	1.39
	Average.....	.....	0.48	0.21	0.13	0.82	13.39	1.45	12.07	1.32
									11.94	1.28
A 3752	Little Giant.....	{ G†	0.35	0.08	0.07	0.41	10.55	1.24	10.00	1.00
A 3853	Little Giant.....	{ F†	0.22	0.07	0.13	0.42	11.45	1.46	9.91	0.99
A 4299	Little Giant.....	.....	0.30	0.07	0.08	0.43	11.13	1.30	9.83	0.99
A 4269	Little Giant.....	.....	0.21	0.09	0.11	0.41	11.20	1.14	10.06	0.97
	Average.....	.....	0.27	0.08	0.10	0.45	11.08	1.28	9.90	0.94
A 4279	Middle West Formula.....	{ G†	1.39	0.34	0.10	1.65	13.45	2.42	12.00	8.00
A 4324	Middle West Formula.....	{ F†	1.38	0.18	0.04	1.60	13.30	2.45	11.06	1.99
	Average.....	.....	1.38	0.26	0.07	1.71	13.39	2.45	10.94	1.85
						0.41			10.00	1.00
A 4047	Super Phosphate and Potash.....	{ G†	0.63	0.14	0.11	0.88	11.30	1.22	10.08	4.00
A 4448	Super Phosphate and Potash.....	{ F†	0.72	0.08	0.13	0.93	9.45	1.68	10.79	3.75
A 4482	Super Phosphate and Potash.....	.....	0.61	0.19	0.08	0.88	10.68	1.83	8.85	4.12
A 4156*	Super Phosphate and Potash.....	.....	0.64	0.15	0.07	0.86	11.65	1.86	9.79	4.23
	Average.....	.....	0.65	0.14	0.09	0.88	11.42	1.54	9.88	4.03
A 3856	Tobacco and Truck Grower.....	{ G†	0.63	0.14	0.11	0.88	8.23	1.06	8.00	8.00
A 3872	Tobacco and Truck Grower.....	{ F†	0.72	0.08	0.13	0.93	9.45	1.68	7.17	1.31
A 4241	Tobacco and Truck Grower.....	.....	0.61	0.19	0.08	0.88	9.30	1.00	7.77	1.63
A 4309	Tobacco and Truck Grower.....	.....	0.64	0.15	0.07	0.86	9.38	1.59	7.79	1.66
	Average.....	.....	0.65	0.14	0.09	0.88	9.09	1.33	7.76	1.59
A 4046	Truck Special.....	{ G†	0.72	0.07	0.07	0.88	10.18	1.36	9.00	7.00
						0.86			9.82	6.30
	Natural Guano Co., Aurora, Ill.									
	Sheep's Head Pulverized Sheep Manure.....	{ G†				3.25			1.00	1.60

†Abbreviations for Guaranteed and Found.
*Full Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen						Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Insoluble Organic	Total	Total	Total	Total	Insoluble	Available	Water Soluble
	Nitrate Agencies Co., Columbus, Ohio											
	NaCo Nitrate of Soda.....	G.†				15.00						
	Pacific Manure & Fertilizer Co., San Francisco, Cal.											
A 4028	Groz-it Brand Pulverized Sheep Manure.....	{ G.†	0.35	0.37	0.82	1.84	1.20	0.75	3.09	0.16	0.75	3.09
A 4057	Groz-it Brand Pulverized Sheep Manure.....	{ P.†	0.40	0.32	0.80	1.82	0.90	1.04	2.95	0.18	1.04	2.95
	Average.....		0.38	0.34	0.81	1.83	1.05	0.88	3.06	0.17	0.88	3.06
	Parke Davis & Co. Detroit, Mich.											
	Perkedale Fertiliser.....	G.†				7.00			0.40		0.60	0.40
	Packers Fertilizer Co., Sandusky, Ohio											
A 4429	Acid Phosphate.....	{ G.†					15.90	2.91	16.00	0.90	16.00	
A 4618*	Acid Phosphate.....	{ P.†					17.35	0.90	18.99	0.90	18.99	
	Average.....						16.62	1.90	14.72	1.90	14.72	
A 3829	Acidulated Phosphate.....	{ G.†					18.30	0.42	17.88	0.42	17.88	
A 3885	Clay Soil Special.....	{ G.†	1.31	0.46	0.06	1.65	14.25	1.70	12.55	1.70	12.55	
A 4423	Clay Soil Special.....	{ P.†	1.24	0.40	0.10	1.74	14.65	1.46	13.19	1.46	13.19	
	Average.....		1.27	0.43	0.08	1.78	14.45	1.58	12.87	1.58	12.87	

A 4634*	Grain Fertilizer.....	G.†				0.88			18.00	
	Phosphate and Bone Meal.....	G.†				0.88		\$2.00	10.00	
	Reliable Wheat and Corn Fertilizer.....	{ G.† F.† }	0.51	0.19	0.16	0.88	0.68	9.95	8.00	2.33
	Royal Grain Grower.....	G.†				0.86			12.00	2.00
	Special Plant Food.....	G.†				1.65			11.00	
A 4184*	Sweetstakes Fertilizer.....	{ G.† F.† }	1.29	0.24	0.18	1.65	0.28	14.10	12.00	2.33
	Nitrate of Soda.....	G.†				1.71			13.82	
	Nitrate of Soda.....	G.†				15.00				
	Read Phosphate Company, New Albany, Indiana									
A 1497	Ten-Ten.....	{ G.† F.† }					1.99	11.75	10.00	10.11
	F. S. Royster Guano Co., Toledo, Ohio									
A 3712	16% Acid Phosphate.....	{ G.† F.† }							16.00	
A 3766	16% Acid Phosphate.....							19.05	18.13	
A 3788	16% Acid Phosphate.....							18.15	17.43	
A 4018	16% Acid Phosphate.....							17.15	16.47	
A 4063	16% Acid Phosphate.....							18.53	17.75	
A 4521*	16% Acid Phosphate.....							17.90	17.18	
A 4557*	16% Acid Phosphate.....							18.45	17.57	
A 4579*	16% Acid Phosphate.....							18.55	17.87	
	16% Acid Phosphate.....							18.80	17.70	
	Average.....							18.22	17.51	
A 3894	Black Soil Guano.....	{ G.† F.† }	0.61	0.12	0.18	0.80	0.71	10.90	8.00	6.00
A 4064	Black Soil Guano.....		0.48	0.10	0.17	0.91	2.66	11.20	8.24	4.61
A 4248	Black Soil Guano.....		0.56	0.10	0.14	0.75	2.63	10.40	8.57	4.54
	Average.....		0.55	0.11	0.16	0.80	1.98	10.40	8.42	4.76
						0.82	2.42	10.83	8.41	4.63
A 3966	Bully Guano.....	{ G.† F.† }	1.23	0.18	0.21	1.60		10.20	8.00	6.00
						1.62	1.20		9.00	4.99

†Abbreviations for Guaranteed and Found.

*Fall Samples.

A 4403	Security Brand.....	1.11	0.31	0.23	1.64	14.75	2.02	13.73	.....
A 4492*	Security Brand.....	1.27	0.32	0.24	1.83	14.60	2.36	13.22	.....
	Average.....	1.23	0.32	0.20	1.75	14.82	2.10	13.72	.....
A 3791	Special Fish Guano.....	{ G† F† }		.....	0.80	.....	.....	11.00	8.00
A 4249	Special Fish Guano.....	0.51	0.17	.....	0.80	13.10	.....	12.08	1.81
A 4318	Special Fish Guano.....	0.50	0.21	0.10	0.81	13.40	0.90	12.50	2.21
A 4408	Special Fish Guano.....	0.61	0.17	0.10	0.88	12.95	1.78	11.17	1.98
A 4610*	Special Fish Guano.....	0.48	0.21	0.14	0.83	12.55	1.71	10.84	1.94
A 4160*	Special Fish Guano.....	0.36	0.21	0.15	0.73	12.50	0.94	12.66	2.18
A 4160*	Special Fish Guano.....	0.47	0.19	0.15	0.81	12.25	0.74	11.51	2.29
	Average.....	0.49	0.19	0.13	0.81	12.96	1.18	11.78	2.07
A 3888	Supreme Guano.....	{ G† F† }		.....	1.60	.....	.....	8.00	8.00
A 4067	Supreme Guano.....	1.27	0.22	0.17	1.66	10.25	1.26	8.99	7.84
A 4090	Supreme Guano.....	0.93	0.25	0.21	1.59	10.75	1.02	9.73	9.17
A 4254	Supreme Guano.....	1.25	0.21	0.20	1.89	10.60	1.26	8.96	8.30
	Average.....	1.15	0.23	0.19	1.57	10.45	1.17	9.28	7.83
A 3729	Vim Guano.....	{ G† F† }		.....	1.60	.....	.....	18.00	8.00
A 3790	Vim Guano.....	1.34	0.22	0.06	1.64	14.75	1.28	13.47	2.19
A 3814	Vim Guano.....	1.23	0.19	0.20	1.62	14.55	1.32	13.53	1.70
A 4319	Vim Guano.....	1.22	0.26	0.13	1.73	14.80	0.86	13.94	2.16
A 4623*	Vim Guano.....	1.23	0.20	0.13	1.61	13.80	0.78	13.02	2.08
	Average.....	1.18	0.24	0.29	1.81	14.40	0.92	13.48	2.21
A 3722	Wonder Guano.....	1.24	0.25	0.19	1.68	14.52	1.03	13.49	2.07
A 3768	Wonder Guano.....	{ G† F† }		.....	0.80	.....	.....	8.00	8.00
A 3861	Wonder Guano.....	0.49	0.06	0.17	0.74	10.90	2.18	8.72	2.97
A 4213	Wonder Guano.....	0.57	0.12	0.12	0.81	10.20	2.18	8.02	3.24
A 4159*	Wonder Guano.....	0.53	0.14	0.14	0.81	10.65	2.14	8.51	3.89
A 4563*	Wonder Guano.....	0.48	0.16	0.16	0.80	10.45	2.52	7.93	2.95
A 4663*	Wonder Guano.....	0.36	0.13	0.14	0.83	11.30	1.90	9.40	3.06
	Average.....	0.52	0.17	0.17	0.86	10.05	1.06	8.99	3.01
	Ottawa Lake.....	0.60	0.18	0.13	0.91	10.35	1.06	9.29	3.07
	Average.....	0.51	0.14	0.14	0.79	10.55	1.86	8.69	3.03
A 4250	10-8 Phosphate and Potash.....	{ G† F† }		.....	.....	.....	.....	10.00	8.00
	Average.....	.....	.....	.....	.....	12.20	1.04	11.16	8.96
A 3883	10-10 Phosphate and Potash.....	{ G† F† }		.....	.....	.....	.....	10.00	10.00
A 4066	10-10 Phosphate and Potash.....	.....	.....	.....	.....	11.95	1.12	10.82	8.99
A 4262	10-10 Phosphate and Potash.....	.....	.....	.....	.....	12.55	1.20	10.82	8.99
	Average.....	.....	.....	.....	.....	11.95	1.00	10.82	8.99
	Average.....	.....	.....	.....	.....	12.15	1.11	11.04	8.99

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen					Phosphoric Acid		Potash	
			As Soluble	As Active Organic	As Inactive Organic	Insoluble Organic	Total	Total	Insoluble		Available
F. S. Royster Guano Co.—Cont.											
A 3721	12-2 Phosphate and Potash.	{ G.† { F.†								12.00	2.00
A 3895	12-2 Phosphate and Potash.								1.84	12.91	1.86
A 4247	12-2 Phosphate and Potash.								2.19	11.66	2.02
A 4316	12-2 Phosphate and Potash.								1.60	13.00	1.63
A 3992*	12-2 Phosphate and Potash.								1.74	12.11	2.56
A 4131*	12-2 Phosphate and Potash.								0.92	13.68	2.03
A 4559*	12-2 Phosphate and Potash.								0.98	13.37	2.06
A 4558*	12-2 Phosphate and Potash.								2.26	13.49	2.11
A 4560*	12-2 Phosphate and Potash.								2.16	12.09	1.99
	Average.								14.49	1.71	12.78	2.02
A 3723	12-4 Phosphate and Potash.	{ G.† { F.†								12.00	4.00
A 3767	12-4 Phosphate and Potash.								4.14	10.84	3.46
A 3937	12-4 Phosphate and Potash.								2.06	12.29	4.00
A 4212	12-4 Phosphate and Potash.								2.30	13.10	4.09
A 4372	12-4 Phosphate and Potash.								2.34	12.26	4.27
A 4416	12-4 Phosphate and Potash.								1.76	12.14	4.36
A 4539*	12-4 Phosphate and Potash.								3.64	10.04	4.47
A 4558*	12-4 Phosphate and Potash.								1.10	12.80	4.09
A 4559*	12-4 Phosphate and Potash.								1.32	13.88	4.04
A 4648*	12-4 Phosphate and Potash.								1.24	12.56	3.83
	Average.							14.41	2.21	12.20	4.01
A 3841	2-8-15.	{ G.† { P.†	0.97	0.24	0.39	1.60			8.00	15.00	
A 3850	2-8-15.		1.10	0.24	0.35	1.50		1.02	8.98	14.36	
A 4060	2-8-15.		1.18	0.20	0.19	1.69		1.06	8.99	14.34	
A 4069	2-8-15.		1.17	0.26	0.22	1.57		1.10	9.05	13.75	
A 4087	2-8-15.		1.34	0.15	0.24	1.65		1.10	9.30	14.73	
A 4253	2-8-15.		1.25	0.16	0.19	1.73		1.04	9.31	14.04	
	Average.		1.17	0.21	0.24	1.62		1.05	9.15	14.09	
	6-10 Phosphate and Potash.	G.†						10.20	6.00	10.00	

FERTILIZER ANALYSES

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Smith Agricultural Chem. Co., Columbus, Ohio

A 3720 A 3726 A 4041 A 4041* A 4124*	16% Acid Phosphate. 16% Acid Phosphate. 16% Acid Phosphate. 16% Acid Phosphate.	{ G† P†	Wayne..... Plymouth..... Nunica..... Zealand.....	18.20 18.70 18.05 17.95	1.04 1.42 0.90 0.80	16.00 17.16 17.28 17.15
Average.....				18.22	1.04	17.18	.....
A 4043 A 4256 A 4323 A 4480 A 4549*	Ammoniated Phosphate & Potash. Ammoniated Phosphate & Potash. Ammoniated Phosphate & Potash. Ammoniated Phosphate & Potash. Ammoniated Phosphate & Potash.	{ G† P†	Nunica..... Cadmus..... Camden..... Waltz..... Richmond.....	0.48 0.53 0.80 0.10 0.52	0.15 0.14 0.17 0.10 0.13	8.00 8.98 8.00 10.13 9.02	1.00 0.89 1.00 1.05 0.99 1.16
Average.....				0.53	0.14	8.95	1.02
A 3826 A 4451	Climax Phosphate. Climax Phosphate.	{ G† P†	Zealand..... Milan.....	10.65 11.10	0.42 0.58	10.00 10.52	4.00 3.47 4.17
Average.....				10.87	0.50	10.37	3.83
A 3983 A 4492	Crop Producer..... Crop Producer.....	{ G† P†	Cassopolis..... Plymouth.....	1.27 1.26	0.18 0.22	10.40 11.40	1.00 0.80 0.80 0.83
Average.....				1.26	0.20	10.90	0.84
A 4381	Grain Grower.....	{ G† P†	Palmyra.....	0.46	0.14	16.50	1.20
A 4414	Grain Grower.....	{ G† P†	Petersburg.....	0.64	0.12	16.45	1.44
A 3982	Smith's One-Ten.....	{ G† P†	Cassopolis.....	0.58	0.13	12.05	0.86
A 4042 A 4255 A 4413	Phosphate & Potash..... Phosphate & Potash..... Phosphate & Potash.....	{ G† P†	Nunica..... Cadmus..... Petersburg.....	12.15 10.85 9.85	0.66 0.52 0.52	10.00 10.33 9.33	2.00 1.49 1.71 2.03
Average.....				10.95	0.57	10.38	1.74

†Abbreviations for Guaranteed and Found.
*Full Samples.

FERTILIZER ANALYSES

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A 4139*	Southern Bone & Potash 0-10-4	{ G† P†	10.00	4.00
A 4173*	Southern Bone & Potash 0-10-4	{ G† P†	10.41	3.99
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	10.56	3.96
A 4148*	Southern Bone & Potash 0-12-2	{ G† P†	.....	.....	.....	.....	.....	.....	12.07	3.53
A 4628*	Southern Bone & Potash 0-12-2	{ G† P†	.....	.....	.....	.....	.....	.....	13.60	3.00
A 4670*	Southern Bone & Potash 0-12-2	{ G† P†	.....	.....	.....	.....	.....	.....	13.33	2.02
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	13.58	1.83
		{ G† P†	.....	.....	.....	.....	.....	.....	13.50	2.00
A 4164*	Southern Fertilizer 1-8-1	{ G† P†	.....	.....	.....	.....	.....	.....	13.50	1.95
		{ G† P†	.....	.....	.....	.....	.....	.....	13.60	1.00
A 4165*	Southern Fertilizer 1-8-2	{ G† P†	.....	.....	.....	.....	.....	.....	9.60	1.02
A 4629*	Southern Fertilizer 1-8-2	{ G† P†	.....	.....	.....	.....	.....	.....	10.40	3.00
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	10.20	2.06
A 4154*	2-12-0 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	10.30	2.03
A 4564*	2-12-0 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	15.56	.....
A 4611*	2-12-0 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	14.30	.....
A 4643*	2-12-0 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	15.10	.....
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	14.20	.....
A 4153*	2-12-2 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	14.79	.....
A 4161*	2-12-2 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	13.80	.....
A 4698*	2-12-2 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	13.80	.....
A 4630*	2-12-2 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	13.80	.....
A 4642*	2-12-2 Southern Fertilizer	{ G† P†	.....	.....	.....	.....	.....	.....	13.80	.....
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	13.98	.....
	Southern Acid Phosphate 14%	{ G† P†	.....	.....	.....	.....	.....	.....	12.45	2.01
	Southern Bone & Potash 0-12-4	{ G† P†	.....	.....	.....	.....	.....	.....	14.00	.....
	Southern Fertilizer 1-8-3	{ G† P†	.....	.....	.....	.....	.....	.....	18.00	4.00
	Southern Fertilizer 1-8-4	{ G† P†	.....	.....	.....	.....	.....	.....	8.00	3.00
	Southern Fertilizer 1-10-0	{ G† P†	.....	.....	.....	.....	.....	.....	8.00	4.00
	Southern Fertilizer 1-10-2	{ G† P†	.....	.....	.....	.....	.....	.....	10.00	.....
	Southern Fertilizer 1-11-1	{ G† P†	.....	.....	.....	.....	.....	.....	10.00	.....
	Average.....	{ G† P†	.....	.....	.....	.....	.....	.....	11.00	1.00

†Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble
A 4302 A 4322	Southern Fertilizer & Chem. Co.—Cont.									
	Southern Fertilizer 1-12-2	G.†				0.88			18.00	8.00
	Southern Fertilizer 2-8-2	G.†				1.65			8.00	8.00
	Southern Fertilizer 2-10-0	G.†				1.65			10.00	
	Southern Fertilizer 2-10-2	G.†				1.65			10.00	8.00
A 4221 A 4320 A 4447 A 4639*	Southern Fish Fertilizer	G.†				1.65			12.00	8.00
	J. L. & H. Stadler Rend. & Fert. Co., Cleveland, O.									
	16% Acid Phosphate	Jasper	G.†						16.00	
	16% Acid Phosphate	Montgomery	P.†						17.42	
	Average								17.66	
A 4303 A 4454	Acid Phosphate and Potash	Quincy	G.†						10.00	8.00
	Acid Phosphate and Potash	Montgomery	P.†						12.71	1.63
	Acid Phosphate and Potash	Milan							10.21	1.95
	Acid Phosphate and Potash	Maybee							11.35	2.03
	Average								10.55	1.66
A 4303 A 4454	Ammoniated Acid Phosphate	Jasper	G.†						10.00	
	Ammoniated Acid Phosphate	Maybee	P.†						10.18	
				0.66	0.09	0.06	0.80		11.30	
				0.47	0.14	0.15	0.81		11.40	
	Average			0.56	0.12	0.11	0.79		10.38	

A 4220	Corn and Wheat Special	Quincy	{ G.† P.†	0.59	0.14	0.21	0.94	7.68	0.98	8.00	\$ 0.00
A 4321	Corn and Wheat Special	Montgomery	{ G.† P.†	0.49	0.11	0.14	0.80	7.90	0.98	7.00	3.09
A 4501*	Corn and Wheat Special	Quincy	{ G.† P.†	0.46	0.11	0.33	0.84	10.15	1.28	7.25	3.08
A 4637*	Corn and Wheat Special	Maybee	{ G.† P.†	0.40	0.10	0.38	0.90	10.40	1.22	8.91	3.01
		Average		0.54	0.14	0.24	0.92	9.01	0.93	8.06	3.11
A 3765	Harvest King	Blissfield	{ G.† P.†	0.51	0.11	0.26	0.82	10.75	0.76	9.00	1.00
A 4219	Harvest King	Quincy	{ G.† P.†	0.48	0.16	0.19	0.83	12.40	1.40	9.99	1.00
A 4590*	Harvest King	Quincy	{ G.† P.†	0.47	0.19	0.37	1.03	11.75	1.24	11.00	0.98
		Average		0.49	0.15	0.27	0.91	11.63	1.13	10.51	1.01
A 4218	Special Mixture	Quincy	{ G.† P.†							10.50	1.00
A 4455	Special Mixture	Quincy	{ G.† P.†							10.00	5.00
A 4638*	Special Mixture	Maybee	{ G.† P.†							10.82	4.97
		Average								10.01	4.48
A 4589*	Valley Phosphate	Quincy	{ G.† P.†	1.13	0.32	0.63	2.08	11.50	1.54	9.83	1.60
A 4631*	Valley Phosphate	Milan	{ G.† P.†	1.05	0.32	0.62	1.99	12.70	2.76	9.94	1.57
		Average		1.09	0.32	0.62	2.03	12.10	2.15	9.95	1.71
	Bone and Acid Phosphate		G.†				1.45			10.00	
	Grain Grower		G.†				1.60			8.00	2.00
	Pure Bone Meal		G.†				2.80	20.00			
A 4636*	Vegetable Manure	Maybee	{ G.† P.†	0.95	0.27	0.49	1.80	14.00	1.44	12.00	
A 4669*	Vegetable Manure	Pittsford	{ G.† P.†	0.59	0.27	0.32	1.18	15.00	0.82	12.56	
		Average		0.77	0.27	0.41	1.45	14.50	1.13	13.37	
A 3923	Tankage	Battle Creek	{ G.† P.†	1.69	0.23	3.16	4.50	16.00			
							5.07	18.38			

H. Stewart & Sons,
Battle Creek, Michigan

†Abbreviations for Guaranteed and Pounds.
*Full Sample.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Organic	Total	Total	Insoluble	Available	
Swift & Company Chicago, Ill.										
A 3774	Bean & Grain Grower.....	Hillsdale.....	0.47	0.11	0.33	0.89	11.50	1.36	8.00	3.00
A 3783	Bean & Grain Grower.....	Ypsilanti.....	0.39	0.14	0.35	0.88	9.80	1.42	10.14	2.00
A 4076	Bean & Grain Grower.....	Decatur.....	0.52	0.15	0.23	0.90	11.40	1.42	8.38	2.84
A 4236	Bean & Grain Grower.....	Manchester.....	0.59	0.14	0.21	0.94	10.10	1.76	8.34	3.44
A 4605*	Bean & Grain Grower.....	Manchester.....	0.61	0.10	0.10	0.81	9.80	1.10	7.80	3.55
A 4694*	Bean & Grain Grower.....	Cass City.....	0.46	0.18	0.24	0.88	9.50	1.06	8.44	3.18
	Average.....		0.51	0.14	0.24	0.89	10.20	1.35	8.85	2.81
A 3792	Champion Wheat & Corn Grower.....	Albion.....	1.41	0.10	0.12	1.63	14.05	0.72	12.33	8.00
A 3902	Champion Wheat & Corn Grower.....	Portage.....	1.49	0.17	0.10	1.76	13.75	0.86	12.89	1.78
A 4271	Champion Wheat & Corn Grower.....	Hudson.....	1.49	0.19	0.02	1.70	14.30	1.00	13.30	2.08
A 4313	Champion Wheat & Corn Grower.....	Reading.....	1.57	0.14	0.07	1.78	13.25	0.80	12.45	2.10
A 4112*	Champion Wheat & Corn Grower.....	Hamilton.....	1.30	0.21	0.20	1.71	13.60	1.04	12.76	2.74
A 4586*	Champion Wheat & Corn Grower.....	Quincy.....	0.79	0.13	0.11	1.03	13.28	1.50	11.78	2.00
	Average.....		1.34	0.16	0.10	1.60	13.74	0.99	12.75	2.02
A 4485	Clay Soil Special.....	Columbus.....	1.18	0.18	0.07	1.63	13.05	0.84	12.21	.....
A 4504	Clay Soil Special.....	Bad Axe.....	1.27	0.20	0.21	1.68	14.30	0.90	13.40	.....
A 4115*	Clay Soil Special.....	Kent City.....	1.30	0.21	0.10	1.61	14.75	0.86	13.89	.....
	Average.....		1.25	0.19	0.13	1.57	14.03	0.87	13.16	.....
A 3775	Diamond K Grain Grower.....	Hillsdale.....	0.60	0.13	0.18	0.89	14.20	1.38	12.82	1.00
A 3853	Diamond K Grain Grower.....	Marne.....	0.52	0.22	0.17	0.91	14.40	1.50	12.90	0.93
A 3993	Diamond K Grain Grower.....	Ravenna.....	0.59	0.19	0.08	0.86	13.35	1.38	11.97	0.96

A 4314 A 3981	Diamond K Grain Grower. Diamond K Grain Grower.	Reading. Marne.	0.78 0.73	0.19 0.18	0.02 0.03	0.99 0.94	14.00 14.65	1.04 1.16	12.96 13.49	1.32 1.13
	Average.		0.64	0.18	0.10	0.92	14.12	1.29	12.83	1.11
A 3958 A 4062	Fruit & Vegetable Grower. Fruit & Vegetable Grower.	{ G. { P.	1.53 2.03	0.13 0.19	0.07 0.16	1.78 2.38	7.83 12.55	0.74 0.88	10.00 11.67	4.00 3.67
	Average.		1.78	0.16	0.12	2.06	10.19	0.81	9.38	5.33
A 4103*	Garden City Acid Phosphate.	{ G. { F.					16.93	0.90	16.03	
A 3955 A 3973	Grain & Tobacco Grower. Grain & Tobacco Grower.	{ G. { F.	1.21 1.42	0.14 0.12	0.11 0.09	1.65 1.63	11.60 12.75	1.26 0.96	10.00 11.79	4.00 3.65
	Average.		1.32	0.13	0.10	1.55	12.17	1.11	11.06	3.04
A 4088 A 4238 A 4272 A 3952* A 4578*	High Grade Acid Phosphate. High Grade Acid Phosphate. High Grade Acid Phosphate. High Grade Acid Phosphate. High Grade Acid Phosphate.	{ G. { F.					18.35 18.90 19.00 19.05 19.20	1.44 0.95 0.82 1.34 0.70	16.00 16.91 17.95 18.18 17.71 18.50	
	Average.						18.90	1.05	17.85	
A 3732 A 4089 A 4326 A 4351 A 4608*	Muck Soil Fertilizer. Muck Soil Fertilizer. Muck Soil Fertilizer. Muck Soil Fertilizer. Muck Soil Fertilizer.	{ G. { F.	0.68 0.96 1.34 0.61	0.14 0.12 0.15 0.16	0.16 0.08 0.10 0.11	0.82 0.97 1.39 0.83	14.85 13.95 13.70 13.55 14.40	1.80 1.26 0.94 1.32 1.83	12.00 13.05 12.69 12.52 12.52	3.00 3.73 3.33 3.20 3.18
	Average.		0.77	0.14	0.12	1.03	14.09	1.42	12.67	2.86
A 3781 A 4058	Pulverized Manure. Pulverized Manure.	{ G. { F.	0.24 0.25	0.37 0.34	1.27 1.12	1.65 1.88 1.71	1.05 1.50	0.32 0.53	1.00 0.83 0.92	2.00 2.31 1.90
	Average.		0.25	0.35	1.19	1.79	1.27	0.40	0.87	2.10
	Special Truck Fertilizer.	G.				1.47			10.00	3.00
A 3832 A 4315 A 3980*	Superphosphate 2-8-2 Superphosphate 2-8-2 Superphosphate 2-8-2.	{ G. { P.	1.20 1.11 1.21	0.18 0.13 0.21	0.26 0.15 0.17	1.65 1.64 1.59	9.65 9.85 9.90	0.90 0.98 0.86	8.00 8.75 9.04	3.00 2.19 2.97
	Average.		1.18	0.17	0.19	1.54	9.80	0.91	8.89	2.10

*Abbreviations for Guaranteed and Found.
*Fall Samples.

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A 3967	12-4 Fertilizer.....	{ G†	13.00	4.00
A 4207	12-4 Fertilizer.....	{ F†	12.64	3.43
	Average.....		10.50	4.16
A 3773	1-8-1 Complete Fertilizer.....	{ G†	.....	.....	.....	.....	.....	.....	.....	11.57	3.79
A 3782	1-8-1 Complete Fertilizer.....	{ F†	.....	.....	.....	.....	.....	.....	.....	8.00	1.00
A 4089	1-8-1 Complete Fertilizer.....		0.43	0.12	0.15	0.82	0.70	1.10	10.70	0.67	0.67
A 4499	1-8-1 Complete Fertilizer.....		0.44	0.14	0.21	0.79	0.90	1.12	9.80	1.64	1.64
A 4499	1-8-1 Complete Fertilizer.....		0.42	0.14	0.23	0.80	0.80	1.02	9.78	1.00	1.00
A 4114*	1-8-1 Complete Fertilizer.....		0.38	0.14	0.28	0.80	0.80	1.02	7.97	1.03	1.03
	Average.....		0.53	0.09	0.18	0.80	0.80	0.96	8.59	1.55	1.55
	1-8-3 Fertilizer.....	G†	0.44	0.13	0.21	0.78	10.04	1.06	8.98	1.18	1.18
A 4500	1-8-5 Fertilizer.....	{ G†	.....	.....	.....	0.88	.....	.....	8.00	3.00	3.00
	Average.....	{ F†	0.52	0.15	0.24	0.88	10.05	1.02	9.03	4.57	4.57
A 3780	1-8-6 Fertilizer.....	{ G†	0.42	0.12	0.25	0.88	10.70	2.02	8.00	6.00	6.00
A 3831	1-8-6 Fertilizer.....	{ F†	0.57	0.15	0.14	0.79	9.70	1.66	8.04	5.78	5.78
A 3903	1-8-6 Fertilizer.....		0.55	0.11	0.11	0.77	9.36	1.52	7.87	4.13	4.13
A 4077	1-8-6 Fertilizer.....		0.34	0.14	0.25	0.73	9.60	1.58	8.02	5.83	5.83
	Average.....		0.47	0.13	0.19	0.79	9.84	1.69	8.15	5.28	5.28
A 3840	2-8-15 Fertilizer.....	{ G†	.....	.....	.....	1.65	.....	.....	8.00	16.00	16.00
A 3851	2-8-15 Fertilizer.....	{ F†	1.27	0.12	0.17	1.56	9.50	1.04	8.46	15.66	15.66
A 4074	2-8-15 Fertilizer.....		1.23	0.09	0.30	1.62	9.70	1.10	8.60	14.81	14.81
	Average.....		1.26	0.10	0.10	1.46	10.05	1.02	9.03	15.37	15.37
A 3948	3-10-6 Fertilizer.....	{ G†	.....	.....	.....	1.55	9.75	1.05	8.70	15.18	15.18
A 3972	4-8-8 Fertilizer.....	{ F†	1.25	0.11	0.19	2.47	11.80	0.90	10.00	6.00	6.00
	Average.....	{ F†	1.88	0.18	0.11	2.17	9.65	1.30	8.00	8.00	8.00
	Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.		2.55	0.17	0.12	2.84	.....	.....	8.35	8.35	8.35
	Duplex Basic-Phosphate.....	G†	.....	.....	.....	.....	.....	.....	14.00	.....	.....
	Virginia Carolina Chemical Co., Cincinnati, O.		.....	.....	.....	.....	.....	.....	.....	.....	.....
A 4399	V-C Acid & Potash King.....	{ G†	.....	.....	.....	.....	.....	.....	10.00	4.00	4.00
	Average.....	{ F†	.....	.....	.....	.....	.....	.....	10.54	4.33	4.33

*Abbreviations for Guaranteed and Found.

*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Virginia Carolina Chemical Co.—Cont.										
A 4040	V-C 16% Acid Phosphate.	Nunica.						18.00	0.60	19.00
A 4402	V-C 16% Acid Phosphate.	Erie.						17.70	0.34	17.36
A 3999*	V-C 16% Acid Phosphate.	Grand Rapids.						17.70	0.32	17.38
A 4105*	V-C 16% Acid Phosphate.	Jamestown.						17.25	0.40	16.85
A 4662*	V-C 16% Acid Phosphate.	Erie.						16.55	0.50	16.05
		Average.						17.44	0.43	17.01
A 3704	V-C 20% Acid Phosphate.	Adrian.						22.42	1.20	20.00
A 4003	V-C 20% Acid Phosphate.	Sparta.						22.70	1.66	21.04
A 4215	V-C 20% Acid Phosphate.	Quincy.						23.40	1.56	21.84
A 4231	V-C 20% Acid Phosphate.	Ann Arbor.						22.49	0.58	21.91
A 3996*	V-C 20% Acid Phosphate.	Coopersville.						21.35	0.20	21.16
A 4583*	V-C 20% Acid Phosphate.	Quincy.						20.75	0.26	20.49
		Average.						22.18	0.91	21.27
A 3935	V-C Big Potato & Truck.	Fremont.	1.98	0.20	0.32	2.50	0.88	10.90	0.78	10.00
										4.24
A 3703	V-C Bone Meal & Phosphate.	Adrian.	0.29	0.36	0.36	1.01	0.88	24.35	13.32	10.00
A 4306	V-C Bone Meal & Phosphate.	Morenci.	0.46	0.28	0.10	0.84	0.84	24.40	13.60	11.03
A 4233	V-C Bone Meal & Phosphate.	Manchester.	0.29	0.40	0.33	1.02	1.02	23.70	12.55	10.80
A 4608*	V-C Bone Meal & Phosphate.	Manchester.	0.32	0.42	0.34	1.08	1.08	23.15	12.55	11.16
		Average.	0.34	0.36	0.28	0.98	0.98	23.90	13.01	10.60
										10.89
A 4235	V-C Champion Corn & Wheat Grower.	Manchester.	0.64	0.11	0.18	0.88	0.88	10.40	1.12	8.00
A 4265	V-C Champion Corn & Wheat Grower.	Clayton.	0.57	0.13	0.18	0.88	0.88	10.80	1.00	9.80
		Average.	0.61	0.12	0.18	0.91	0.91	10.60	1.06	9.54
	V-C Complete Fertilizer.					1.65				8.00

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A 4039	V-C Complete Manure.....	{G†	0.26	0.30	0.35	0.89	17.65	7.00	8.00	1.00
A 4401	V-C Complete Manure.....	{F†	0.59	0.13	0.16	0.91	10.56	1.06	10.65	1.20
A 4264	V-C Complete Manure.....		0.70	0.11	0.10	0.88	10.30	1.12	9.49	1.63
A 4254	V-C Complete Manure.....		0.60	0.14	0.14	0.91	10.40	1.42	9.18	1.26
A 4607*	V-C Complete Manure.....		0.72	0.13	0.20	1.04	10.95	1.42	9.88	1.20
A 4661*	V-C Complete Manure.....		0.53	0.22	0.16	0.90	10.50	0.72	9.58	1.38
	Average.....		0.57	0.17	0.18	0.92	11.72	2.12	9.76	1.23
A 4304	V-C Farmers Friend.....	{G†	0.72	0.11	0.11	0.89	9.40	0.80	8.00	1.29
A 4606*	V-C Farmers Friend.....	{F†	0.54	0.16	0.16	0.86	10.20	0.66	8.20	1.00
	Average.....		0.63	0.13	0.14	0.90	9.80	0.73	9.07	1.06
A 3892	V-C Monarch Acid & Potash Compound.....	{G†							10.00	8.00
A 4216	V-C Monarch Acid & Potash Compound.....	{F†					12.35	1.30	11.05	8.98
A 4456	V-C Monarch Acid & Potash Compound.....						12.70	1.26	11.41	8.73
	Average.....						12.35	1.02	11.33	8.28
A 4412	V-C Plant Food for Vegetables, Lawns & Flowers.....	{G†	3.82	0.70	0.77	4.99	9.95	2.25	8.00	8.66
A 4311	V-C Pride of the North.....	{G†	1.52	0.15	0.18	1.65	12.40	2.14	10.00	8.00
A 3998*	V-C Pride of the North.....	{F†	1.37	0.12	0.25	1.74	11.60	0.50	10.26	9.40
	Average.....		1.44	0.14	0.21	1.79	12.00	1.32	11.10	7.66
A 4400	V-C Prolific Grain Grower.....	{G†							10.68	8.53
A 4458	V-C Prolific Grain Grower.....	{F†					14.30	0.92	18.00	8.00
	Average.....						14.30	0.58	13.28	2.33
A 4453	V-C Red Cross 14%.....	{G†							13.50	2.35
A 4660*	V-C Rescue Fertilizer.....	{G†	1.31	0.25	0.35	1.65	17.10	0.82	14.00	2.38
	V-C Richmus Fertilizer.....	{F†					13.25	0.52	11.00	2.35
	Average.....					0.41			18.00	2.35
A 3754	V-C Springfall Fertilizer.....	{G†	1.10	0.22	0.28	1.65	14.95	1.34	12.00	2.21
A 4232	V-C Springfall Fertilizer.....	{F†	1.31	0.19	0.27	1.60	14.60	1.04	13.61	2.21
A 4305	V-C Springfall Fertilizer.....		1.43	0.11	0.13	1.77	14.80	0.94	13.56	2.69
A 3993*	V-C Springfall Fertilizer.....		1.28	0.23	0.25	1.67	13.95	0.32	13.86	2.52
	Average.....		1.28	0.19	0.23	1.70	14.58	0.91	13.63	2.14

Abbreviations for Guaranteed and Found.
*Fall Samples.

ANALYSES OF COMMERCIAL FERTILIZER FOR 1920, EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble	As Inactive Insoluble	Total	Total	Insoluble	Available	
A 3755	Virginia Carolina Chemical Co.—Cont. V-C Sure Grain Producer.....	Blissfield..... { G.† F.†	0.52	0.26	0.22	0.88 1.00	15.20	0.94	15.00 14.26	Water Soluble
A 4291 A 4336 A 4342 A 4613	The Welch Chemical Co., Columbus, O.	Williamston..... { G.† F.†	0.56	0.08	0.16	0.80	12.15	2.04	11.00	5.00
		Bancroft.....	0.44	0.07	0.14	0.65	12.30	1.16	10.11	3.18
		Henderson.....	0.34	0.10	0.24	0.68	12.06	1.34	11.14	2.80
		Saline.....	0.48	0.11	0.31	0.90	13.10	2.18	10.71	2.09
		Average.....	0.46	0.09	0.21	0.76	12.40	1.68	10.72	3.74
A 3797 A 4355 A 4151* A 4614*	No. 2 Independent Bone Meal & Phosphate Mixture..... No. 2 Independent Bone Meal & Phosphate Mixture..... No. 2 Independent Bone Meal & Phosphate Mixture..... No. 2 Independent Bone Meal & Phosphate Mixture.....	Litchfield..... { G.† F.†	0.35	0.18	0.29	0.80	15.60	7.33	8.27	1.00 1.25
		Linden.....	0.57	0.20	0.30	1.07	16.60	6.25	10.35	1.45
		Marlette.....	0.59	0.12	0.23	0.94	19.40	11.30	8.10	1.37
		Saline.....	0.61	0.14	0.18	0.93	16.10	5.64	10.46	1.19
		Average.....	0.53	0.16	0.25	0.94	16.92	7.63	9.29	1.32
A 4244 A 4278 A 4293 A 4118* A 4523* A 4537* A 4553*	No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover No. 3 Independent Corn, Wheat, Oats & Clover	Manchester..... { G.† F.†	0.26	0.08	0.10	0.41	8.30	0.74	8.00	1.00
			0.21	0.07	0.17	0.45	8.75	0.96	7.79	0.86
			0.24	0.07	0.15	0.46	7.40	0.74	6.66	1.16
			0.20	0.07	0.18	0.45	9.20	1.20	8.00	1.05
			0.31	0.08	0.13	0.52	8.65	0.60	8.06	0.79
			0.25	0.07	0.13	0.45	9.55	1.25	8.30	0.78
			0.17	0.07	0.17	0.41	9.65	1.22	8.43	1.01
										1.18
		Average.....	0.23	0.07	0.15	0.45	8.78	0.96	7.82	0.98

A 3798	No. 4 Independent Grain Special	Litchfield	{F.†}	0.45	0.09	0.19	0.88	8.40	0.96	8.00	1.00
A 4356	No. 4 Independent Grain Special	Linden	{F.†}	0.43	0.12	0.19	0.74	8.75	1.14	7.44	1.00
A 4431	No. 4 Independent Grain Special	Saline	{F.†}	0.25	0.06	0.24	0.73	15.20	1.46	7.61	1.30
A 4651*	No. 4 Independent Grain Special	Litchfield	{F.†}	0.48	0.14	0.24	0.86	9.00	0.90	13.74	1.00
	Average			0.40	0.08	0.20	0.68	10.34	1.11	9.23	1.08
A 4119*	No. 4 Independent Grain Special 1920	Elmdale	{G.†}	0.40	0.15	0.22	0.88	10.65	1.54	8.00	4.00
A 4533*	No. 4 Independent Grain Special 1920	Utica	{F.†}	0.53	0.10	0.21	0.84	9.40	1.40	9.11	4.07
A 4654*	No. 4 Independent Grain Special 1920	Richmond	{F.†}	0.56	0.07	0.10	0.81	9.90	1.14	8.00	2.98
A 4622*	No. 4 Independent Grain Special 1920	Saline	{F.†}	0.56	0.10	0.27	0.93	9.50	1.46	8.76	4.52
	Average			0.53	0.11	0.20	0.84	9.86	1.38	8.48	3.99
A 4132*	No. 5 Independent Universal Crop	Charlotte	{G.†}	1.45	0.28	0.21	1.65	14.80	2.52	10.00	9.00
A 4609*	No. 5 Independent Universal Crop	Manchester	{F.†}	1.49	0.22	0.26	1.97	14.75	2.46	12.28	2.04
A 4616*	No. 5 Independent Universal Crop	Saline	{F.†}	1.21	0.16	0.26	1.63	13.35	1.56	12.29	2.75
	Average			1.38	0.22	0.24	1.84	14.30	2.18	11.79	2.06
A 4525*	No. 6 Independent High Grade General Crop	Grand Ledge	{G.†}	1.06	0.20	0.25	1.60	15.00	1.96	12.12	2.28
A 4117*	No. 6 Independent High Grade General Crop	Elmdale	{F.†}	1.25	0.20	0.25	1.51	15.75	2.36	13.04	9.00
A 4528*	No. 6 Independent High Grade General Crop	Warren	{F.†}	0.86	0.21	0.32	1.39	13.14	1.70	13.39	2.03
A 4531*	No. 6 Independent High Grade General Crop	Utica	{F.†}	1.11	0.14	0.20	1.48	13.90	1.44	13.14	2.08
A 4621*	No. 6 Independent High Grade General Crop	Saline	{F.†}	1.18	0.16	0.22	1.56	14.15	1.36	12.46	2.33
	Average			1.09	0.18	0.25	1.52	14.74	1.78	12.96	2.14
A 3877	No. 7 Independent Corn & Wheat Special	Elmdale	{G.†}	0.54	0.09	0.18	0.88	8.83	1.18	8.00	9.00
A 3706	No. 7 Independent Corn & Wheat Special	Litchfield	{F.†}	0.51	0.13	0.17	0.78	8.70	1.16	7.44	1.95
A 4243	No. 7 Independent Corn & Wheat Special	Manchester	{F.†}	0.42	0.08	0.19	0.67	10.10	1.50	8.54	2.00
A 4116*	No. 7 Independent Corn & Wheat Special	Elmdale	{F.†}	0.69	0.12	0.17	0.98	9.75	0.96	8.60	2.04
A 4524*	No. 7 Independent Corn & Wheat Special	Grand Ledge	{F.†}	0.63	0.12	0.15	0.94	9.03	1.25	8.76	2.02
A 4555*	No. 7 Independent Corn & Wheat Special	Richmond	{F.†}	0.47	0.14	0.14	0.75	9.50	1.10	7.81	1.88
	Average			0.52	0.11	0.17	0.80	9.47	1.32	8.08	2.01
A 4423	No. 9 Independent Ammoniated Phosphate	Saline	{G.†}	0.23	0.08	0.14	0.41	13.43	1.89	12.00	1.96
A 4624*	No. 9 Independent Ammoniated Phosphate	Saline	{F.†}	0.17	0.08	0.16	0.41	13.55	1.58	11.94	.....
	Average			0.20	0.08	0.15	0.43	13.49	1.73	11.76	.....

Abbreviations for Guaranteed and Found.
*Fall Samples.

A 4333	EE Gem Fertilizer.....	Ovid.....	0.28	0.07	0.10	0.45	9.20	1.10	8.10	3.10
A 4146*	EE Gem Fertilizer.....	Otisville.....	0.20	0.07	0.15	0.42	8.60	1.17	7.43	3.02
A 4570*	EE Gem Fertilizer.....	Durand.....	0.17	0.09	0.13	0.39	11.70	1.50	10.20	2.08
A 4576*	EE Gem Fertilizer.....	Morris.....	0.19	0.06	0.14	0.39	10.55	1.20	9.35	2.63
	Average.....		0.23	0.07	0.13	0.43	9.92	1.15	8.77	2.73
		{ G.†				0.40			11.00	
A 3709	EE Ruby Fertilizer.....	Washington.....	0.43	0.09	0.13	0.65	13.25	1.40	11.85	
A 3573	EE Ruby Fertilizer.....	Woodland.....	0.15	0.14	0.13	0.48	10.73	1.06	9.67	
A 4334	EE Ruby Fertilizer.....	Ovid.....	0.24	0.16	0.06	0.48	11.63	1.27	10.34	
A 4143*	EE Ruby Fertilizer.....	Otisville.....	0.35	0.11	0.24	0.70	12.05	1.94	10.11	
A 4577*	EE Ruby Fertilizer.....	Perry.....	0.16	0.20	0.15	0.51	12.25	0.99	11.31	
	Average.....		0.26	0.14	0.15	0.55	11.99	1.33	10.66	
		{ G.†				0.80			8.00	1.00
A 3710	EE Spot Cash Fertilizer.....	Washington.....	0.20	0.04	0.14	0.83	9.00	1.06	7.94	1.12
A 3574	EE Spot Cash Fertilizer.....	Woodland.....	0.44	0.08	0.17	0.69	8.68	1.22	7.46	0.95
A 4332	EE Spot Cash Fertilizer.....	Ovid.....	0.64	0.11	0.16	0.91	9.28	1.88	7.69	1.48
A 4144*	EE Spot Cash Fertilizer.....	Montrose.....	0.56	0.11	0.21	0.85	8.85	2.89	7.90	1.32
A 4571*	EE Spot Cash Fertilizer.....	Otisville.....	0.36	0.16	0.33	0.84	8.55	2.44	7.41	1.35
A 4571*	EE Spot Cash Fertilizer.....	Durand.....	0.31	0.19	0.26	0.76	9.50	1.94	7.84	1.02
A 4576*	EE Spot Cash Fertilizer.....	Perry.....	0.45	0.09	0.16	0.73	9.20	1.26	7.94	1.03
	Average.....		0.43	0.11	0.20	0.74	9.12	1.63	7.49	1.22
		{ G.†				1.60			8.00	8.00
A 3713	Onion & Truck Fertilizer.....	Washington.....	1.00	0.07	0.35	1.34	9.75	1.34	8.41	8.33
A 4340	Onion & Truck Fertilizer.....	Henderson.....	1.03	0.10	0.21	1.34	9.25	1.34	7.91	8.54
	Average.....		1.02	0.08	0.25	1.33	9.50	1.34	8.16	8.44
A 4503	16 Per Cent Phosphate.....	Bay Port.....					17.45	0.60	16.00	
		{ G.†							16.85	
	Grade A Barium-Phosphate.....						28.00			

Witherbee, Sherman & Co.,
Worcester, Mass.

†Abbreviations for Guaranteed and Found.
*Fall Samples.

RESULTS OF INSPECTION, SPRING SEASON 1921

On July 1st, 1921, when the administration of the fertilizer law was transferred to the Department of Agriculture, 43 manufacturers and distributors had licensed 405 brands of fertilizer for sale in Michigan during the period ending April 30th, 1922. Nine new companies with 37 brands are included in the list. One of these, the Groves Fertilizer Company, Cincinnati, O., will make no shipments until the fall season.

During the spring shipping season the inspectors collected 609 samples which are classified as follows:

Complete fertilizers	319
Alkaline phosphates	115
Ammoniated phosphates	53
Acid phosphates	84
Bone meal	11
Pulverized manure	12
Ammonium sulfate	4
Nitrate of soda	2
Muriate of potash	4
Kainit	1
Special	4
	<hr/>
	609

Alkaline phosphates are not so-called because they have an alkaline reaction nor because they will produce an alkaline reaction in the soil for they are, in fact, acid in reaction. This term has been used by the trade to distinguish this particular type of fertilizer which is a mixture of acid phosphate and some potash bearing material. Ammoniated phosphate is a term used to designate mixtures containing only nitrogen and phosphoric acid. They are usually prepared by acidulating some organic ammoniate such as leather waste, hair or wool waste and rock phosphate. The process is essentially the same as that followed in the production of acid phosphate. Ammoniated phosphate may also be prepared by dry mixing some available nitrogen bearing material with acid phosphate.

Eighty-nine of the licensed brands were not found on the markets and the manufacturers report that no shipments were made of 58 of these during the spring. Most of these should be found during the fall season. These missing brands are included in the tables which follow but the guaranteed analysis only is given.

DISCUSSION OF RESULTS.

Of the 609 samples analyzed, 158 (25.9%) were found to be below

guarantee in one or more ingredients. Thirty-nine (6.4%) were below in nitrogen, 2 (0.3%) in total phosphoric acid, 45 (7.4%) in available phosphoric acid and 100 (16.4%) in potash. As in the case of last year, the greatest number of deficiencies were due to potash. There is some evidence to indicate that these deficiencies have been due to inefficient factory help but there is also much evidence to indicate, in some cases, a very lax system of factory control.

The results of the inspection pretty accurately reflect the carefulness of the manufacturer in preparing his products for the market and every user of commercial fertilizer should carefully study the fertilizer bulletin, in order to determine what companies are consistently fulfilling their obligations. While the results of a single season may not be a fair criterion, as something beyond the immediate control of the officers of a company may happen to lower the standard of their product, the performance of a company over a period of years is an accurate index of its integrity and well meaning. The object of the inspection is to protect the user of commercial fertilizers against fraud and unless the real consumers make use of the results, by studying the bulletins, the inspection is not fulfilling its greatest usefulness.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
A 4973	American Agricultural Chemical Co., Detroit, Michigan. A High Grade Garden & Veg. Fertilizer.....	Shelby.....	1.26	0.29	0.29	1.55	9.00	1.22	8.00	5.00
		{ G.†				1.84	10.85		9.63	5.39
		Shelby.....	1.42	0.19	0.10	1.65	15.00		12.00	5.00
		{ F.†				1.71	15.00	1.40	13.60	5.08
A 4974	All Grain Fertilizer.....	Washington.....	1.32	0.22	0.16	1.70	14.10	1.40	12.70	3.03
A 5385	All Grain Fertilizer.....	Average.....	1.37	0.21	0.13	1.71	14.55	1.40	13.15	3.06
A 5297	AmoPhos Fertilizer.....	Detroit.....	1.18	0.41	0.18	1.65	15.00		12.00	.....
		{ F.†				1.77	15.00	1.90	13.15	.....
A 5295	Beet Fertilizer 1916.....	Detroit.....	0.57	0.13	0.25	0.88	10.00	0.75	9.22	1.00
		{ F.†				0.95	10.00		9.00	1.08
A 4712	Climax Complete Fertilizer.....	Eaton Rapids.....	1.25	0.26	0.25	1.65	9.00		8.00	3.00
		{ F.†				1.78	10.30	0.98	9.32	3.33
A 4963	Climax Complete Fertilizer.....	Eaton Rapids.....	1.29	0.25	0.27	1.81	10.85	0.94	9.91	2.27
		Average.....	1.27	0.27	0.26	1.80	10.58	0.96	9.62	2.30
A 5352	Crown Phosphate & Potash.....	Devision.....					15.00		12.00	2.00
		{ F.†					14.45	1.24	13.21	2.10
		Elba.....					14.35	1.32	13.03	2.00
		Washington.....					14.05	1.04	13.01	2.00
A 5384	Crown Phosphate & Potash.....	Average.....					14.28	1.20	13.08	2.03
A 4995	Dissolved Bone Phos. & Potash.....	Dys.....					11.00		10.00	2.00
		{ F.†					11.80	0.88	10.92	2.05
		Washington.....					12.20	0.92	11.28	2.04
		Average.....					12.00	0.90	11.10	2.05

FERTILIZER ANALYSES

A 4715	Double 10 Fertilizer.....	{G↑								11.00			10.00	10.00
A 4716	Double 10 Fertilizer.....	{F↑								11.20			10.30	10.13
A 4717	Double 10 Fertilizer.....									12.60			12.14	9.43
A 4718	Double 10 Fertilizer.....									12.60			10.36	9.13
A 5358	Double 10 Fertilizer.....									12.20			11.38	11.00
	Average.....									11.90	0.72		11.18	9.87
A 5259	Favorite Potash Fertilizer.....	{G↑								9.00			9.00	9.00
A 5337	Favorite Potash Fertilizer.....	{F↑								9.75	0.70		9.05	2.93
			0.62	0.15	0.24					9.90	0.42		9.48	2.02
			0.66	0.14	0.25					1.05				
	Average.....		0.59	0.14	0.25	0.98				9.83	0.56		9.27	2.45
A 4874	Fine Ground Bone.....	{G↑								1.65				
		{F↑				1.93				28.60				
			0.60	0.88	0.45					11.75	1.70		10.00	5.00
A 4718	High Grade Phosphate & Potash.....	{G↑								9.00			10.05	4.75
		{F↑								11.75				
A 4189	Maine Potato Formula.....	{G↑								9.00			8.00	10.00
		{F↑				1.70				9.55	1.14		8.41	12.07
A 4717	M. & I. 3% Potash Fertilizer.....	{G↑								9.00			8.00	5.00
		{F↑				0.86				9.55	0.82		8.73	3.41
A 5303	Michigan Bean Grower 1916.....	{G↑								9.00			8.00	1.00
		{F↑				1.78				9.75	1.24		8.51	1.26
A 4191	Michigan 10% Potash Fertilizer.....	{G↑								6.00			5.00	10.00
A 5204	Michigan 10% Potash Fertilizer.....	{F↑				0.93				6.25	0.46		5.79	11.96
			0.88	0.16	0.10	0.93				9.90	1.00		8.90	10.06
			1.26	0.28	0.23	1.77								
	Average.....		0.97	0.21	0.17	1.35				8.08	0.73		7.35	11.01
A 4806	Muriate of Potash.....	{G↑												48.00
		{F↑												51.32
A 4996	New York State Special 1916.....	{G↑								9.00			8.00	1.00
A 5257	New York State Special 1916.....	{F↑				1.07				10.15	0.72		9.43	1.16
			0.59	0.20	0.28	1.01				9.93	0.66		9.29	1.09
			0.67	0.12	0.22									
	Average.....		0.63	0.16	0.25	1.04				10.05	0.69		9.36	1.13
A 4947	Nitrate of Soda.....	{G↑												
		{F↑				15.00								
						16.02								
A 4997	1 and 10 Compound.....	{G↑								11.00			10.00	
A 5370	1 and 10 Compound.....	{F↑				1.08				12.35	1.06		11.29	
			0.59	0.24	0.26	1.29				13.65	1.44		12.21	
			0.74	0.28	0.27									
	Average.....		0.67	0.26	0.26	1.19				13.00	1.25		11.75	

Abbreviations for Guaranteed and Found.

**ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.**

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble
A 5326	American Agricultural Chem. Co.—Cont. Special Nitrophos.....	Detroit.....	{ G.† F.†	1.09	0.43	0.31	1.85 1.83	1.76	10.00 11.09	.....
A 5306	Sulphate of Ammonia..... Bradley Brands	Detroit.....	{ G.† F.†	.....	.....	20.16 20.48	.....	.....	.....	.....
	Alkaline Phosphate & Potash.....	.....	G.†	.....	.....	.....	.....	.....	10.00	\$.00
A 5296	All Crops Fertilizer.....	Detroit.....	{ G.† F.†	0.51	0.14	0.25	0.88 0.90	0.82	11.00 11.70	1.00 1.08
A 4891	Bin Filler.....	Buchanan.....	{ G.† F.†	1.10	0.41	0.26	1.65 1.77	1.96	11.00 12.35	.....
A 5314	B. D. Sea Fowl Guano with Potash.....	Detroit.....	{ G.† F.†	1.25	0.31	0.17	1.65 1.73	1.12	9.00 9.80	1.00 1.26
A 4892	Dissolved Bone Phos. with Potash 1916.....	Buchanan.....	{ G.† F.†	0.55	0.19	0.27	0.88 1.01	0.64	9.00 9.45	1.00 1.20
A 4890	16% Acid Phosphate.....	Buchanan.....	{ G.† F.†	.....	.....	.....	.....	1.50	17.00 18.00	.....
A 5331	Soluble Dissolved Bone Phosphate..... Crocker Brands	Detroit.....	{ G.† F.†	.....	.....	.....	.....	1.46	15.00 16.00	.....
A 5315	Ammoniated Wheat & Corn Phos. 1916.....	Detroit.....	{ G.† F.†	1.30	0.31	0.20	1.65 1.81	1.20	9.00 9.80	1.00 1.26

[illegible]

†Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble	As Inactive Organic	Total	Total	Insoluble	Available	
A 5332	American Agricultural Chem. Co.—Cont. Michigan Carbon Works Brands—Cont. Red Line Crop Grower.....	Detroit.....	1.25	0.29	0.17	1.65 1.71	9.00	1.22	8.00	2.00 2.10
			{G.† F.†}				9.60		8.38	
A 4190 A 5203	Red Line Phosphate..... Red Line Phosphate.....	Coopersville Wayne.....					16.00		14.00	
			{G.† F.†}				18.40 15.45	1.78 1.30	14.62 14.15	
A 4749 A 5209	Red Line Phosphate with Potash..... Red Line Phosphate with Potash.....	Ovid..... Milan.....					15.93	1.54	14.39	
			{G.† F.†}				11.00 11.70 11.80	1.08 0.78	10.00 10.62 11.02	2.00 2.01
A 5325	Soil Builder.....	Average.....					11.75	0.93	10.82	2.01
			{G.† F.†}				11.00 12.75	1.68	10.00 11.07	
A 4192 A 4707 A 4718 A 4866	Superior Acid Phosphate..... Superior Acid Phosphate..... Superior Acid Phosphate..... Superior Acid Phosphate.....	Homertown..... Homertown..... Ovid..... South Haven.....					17.00		16.00	
			{G.† F.†}				18.30 17.70 18.90 18.10	1.88 1.84 1.53 1.30	16.42 16.26 17.38 16.80	
A 4709	Trianton Fertilizer.....	Average.....					18.25	1.55	16.70	
			{G.† F.†}				18.00 14.50		18.00 12.34	
A 5459	Usenmore Fertilizer.....	Homer.....	1.14	0.38	0.15	1.65 1.67	15.00	2.16	12.84	
			{G.† P.†}				14.20	1.22	12.98	2.00 2.10
A 5316	Michigan Carbon Works—Homestead Bean Fertilizer.....	Saline.....					15.00		13.00	
			{G.† P.†}				14.20	1.22	12.98	
A 5316	Michigan Carbon Works—Homestead Bean Fertilizer.....	Detroit.....	1.36	0.30	0.18	1.65 1.84	9.00	1.24	8.00	1.00 1.36
			{G.† F.†}				10.45		9.21	

A 4708	Bialode Fertilizer.....	{ G† P†	0.50	0.14	0.23	0.82 0.87	11.00 11.05	0.86	10.00 10.70	1.00 1.24
A 4710	Bone Black Fertilizer with Potash.....	{ G† P†	1.23	0.32	0.26	1.65 1.81	9.00 10.10	1.10	8.00 9.00	1.00 1.21
A 4987	Bone Black Sugar Beet Fertilizer.....	{ G† P†	0.67	0.13	0.25	0.82 1.05	10.00 9.55	0.78	9.00 8.77	1.00 1.23
A 4833	Grain Fertilizer.....	{ G† P†	1.25	0.19	0.06	1.65 1.50	15.00 13.85	1.49	18.00 13.37	5.00 3.30
A 5387	Grain Fertilizer.....	{ G† P†	1.39	0.18	0.09	1.66 1.40	14.65	1.40	13.25	2.72
	Average.....		1.32	0.19	0.07	1.58	14.25	1.44	12.81	3.01
A 4799	High Grade Garden & Vegetable Fert.....	{ G† P†	1.25	0.29	0.30	1.65 1.84	9.00 10.60	1.26	8.00 9.34	5.00 5.25
A 5232	High Grade Garden & Vegetable Fert.....	{ G† P†	1.18	0.28	0.30	1.76	10.40	1.18	9.22	5.46
	Average.....		1.21	0.29	0.30	1.80	10.50	1.22	9.28	5.35
A 4800	Special Potash Fertilizer.....	{ G† P†	0.70	0.12	0.23	0.82 1.05	9.00 9.65	0.60	8.00 9.05	2.04
A 5422	Special Potash Fertilizer.....	{ G† P†	0.62	0.12	0.19	0.93	10.50	0.76	9.74	2.04
	Average.....		0.66	0.12	0.21	0.99	10.08	0.68	9.40	2.04
A 5311	Sugar Beet Fertilizer 1916.....	{ G† P†	0.73	0.13	0.22	0.82 1.08	10.00 10.25	0.82	9.00 9.43	1.00 1.12
	Average.....		0.66	0.12	0.21	0.99	10.08	0.68	9.40	2.04
A 5317	Bean Grower.....	{ G† P†	1.33	0.30	0.18	1.65 1.81	9.00 10.15	1.34	8.00 8.81	1.00 1.38
A 5338	Dissolved Bone Phosphate.....	{ G† P†					15.00 19.30	1.38	14.00 15.92	
A 4719	General Crop Fertilizer.....	{ G† P†	0.45	0.13	0.26	0.82 0.84	11.00 11.55	0.80	10.00 10.75	1.00 1.14
A 5371	High Grade Phosphate.....	{ G† P†					17.00 18.50	1.40	16.00 17.10	
A 5258	Wheat & Corn Producer 1916.....	{ G† P†	0.62	0.11	0.24	0.82 0.97	10.00 10.15	0.66	9.00 9.49	1.00 1.01
	Average.....		0.39	0.15	0.31	0.85	11.83	0.72	11.11	1.23
A 5201	Acidulated Bone Phosphate & Potash.....	{ G† P†	0.40	0.15	0.31	0.82 0.86	11.00 11.55	0.62	10.00 10.93	1.00 1.24
A 5405	Acidulated Bone Phosphate & Potash.....	{ G† P†	0.39	0.15	0.30	0.84	12.10	0.82	11.28	1.22
	Average.....		0.39	0.15	0.31	0.85	11.83	0.72	11.11	1.23

†Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Organic	Total	Total	Insoluble	Available	
A 5319	American Agricultural Chem. Co.—Cont. North Western Horse Shoe Brands—Cont. Bean Special 1916.....	Detroit..... { G† F†	1.38	0.31	0.18	1.65 1.87	9.00 9.80	1.28	8.00 8.52	1.00 1.32
A 4767 A 5403	Bone Phosphate & Potash..... Bone Phosphate & Potash.....	Swartz Creek..... Warren..... { G† F†					11.00 11.40 12.00	0.88 1.02	10.00 10.38 10.98	8.00 8.00 8.00 2.06 2.33
	Average.....						11.70	0.95	10.75	2.20
A 4795 A 4927 A 5251	Corn and Wheat Grower..... Corn and Wheat Grower..... Corn and Wheat Grower.....	Adrian..... Muskegon Heights..... Plymouth..... { G† F†	1.20 1.07 1.24	0.26 0.29 0.26	0.27 0.27 0.27	1.65 1.73 1.83 1.77	9.00 9.80 10.16 9.90	0.88 1.00 0.98 0.90	8.00 8.80 9.27 9.00	8.00 8.80 8.84 8.32
	Average.....		1.17	0.27	0.27	1.71	9.95	0.93	9.02	2.61
A 5348	Dissolved Ammoniated Bone Phosphate.....	Davison..... { G† F†	1.22	0.41	0.22	1.65 1.85	13.00 16.65	2.48	12.00 14.17	.....
A 4765	P. & F. Fertilizer.....	Swartz Creek..... { G† F†	0.59	0.21	0.18	0.88 0.98	11.00 12.15	1.02	10.00 11.13	.....
A 4958 A 5226	Garden City Superphosphate with Potash..... Garden City Superphosphate with Potash.....	Nashville..... Blissfield..... { G† F†	1.22 1.17	0.30 0.34	0.35 0.32	1.65 1.83	9.00 10.70 10.10	0.96 1.16	8.00 9.74 8.94	1.00 1.16 1.10
	Average.....		1.20	0.32	0.33	1.85	10.40	1.06	9.34	1.13
A 5386	High Grade Vegetable Fertilizer.....	Corunna..... { G† F†	1.21	0.27	0.26	1.65 1.74	9.00 11.20	1.02	8.00 10.18	6.00 5.14
A 4764 A 4928	0-10-5 Potash Manure..... 0-10-5 Potash Manure.....	Swartz Creek..... Muskegon Heights..... { G† F†					11.00 12.45 12.30	1.64 1.34	10.00 10.81 10.98	8.00 4.58 4.92
	Average.....						12.38	1.49	10.80	4.73

Potash Manure.	G.†					0.88			\$.00	\$.00
A 4737 Potash Manure 1916.....	{ G.†					0.88			\$.00	\$.00
A 4766 Potash Manure 1916.....	{ P.†	0.56	0.15	0.23	0.56	0.94	0.89	0.56	9.24	1.22
		0.55	0.17	0.22	0.86	0.94	0.94	0.86	8.56	1.06
Average.....		0.56	0.16	0.22		0.94	0.94	0.71	8.92	1.14
16% Phosphate.	{ G.†						17.00		16.00	
A 4726 16% Phosphate.....	{ P.†						17.85	1.42	16.43	
A 4873 16% Phosphate.....							17.30	1.24	16.06	
A 4961 16% Phosphate.....							19.10	1.40	17.70	
A 5420 16% Phosphate.....							18.60	1.50	17.10	
Average.....							18.21	1.39	16.82	
Special Dissolved Amophos.	{ G.†					1.65	11.00		10.00	
A 4960	{ P.†	1.23	0.40	0.22		1.85	13.60	1.96	11.64	
Special Grain Fertilizer.	{ G.†					1.66	19.00		18.00	\$.00
A 5947 Special Grain Fertilizer.....	{ P.†	1.32	0.18	0.10		1.60	13.85	1.42	12.43	3.01
A 5404		1.19	0.21	0.20		1.60	13.90	1.32	12.58	3.08
Average.....		1.25	0.20	0.15		1.60	13.88	1.37	12.51	3.05
Square Deal Phosphate.	{ G.†						16.00		14.00	
A 4724 Square Deal Phosphate.....	{ P.†						15.95	1.36	14.59	
A 5412							17.20	1.42	15.78	
Average.....							16.58	1.39	15.19	
Sugar Beet Fertilizer 1916.	{ G.†					0.88	10.00		9.00	1.00
A 5307 Sugar Beet Fertilizer 1916.....	{ P.†	0.59	0.17	0.25		1.01	9.80	0.46	9.34	1.13
A 5355		0.62	0.11	0.24		0.97	10.15	0.50	9.65	1.06
Average.....		0.60	0.14	0.25		0.99	9.98	0.48	9.50	1.10
2 Potash Fertilizer.	{ G.†					0.88	9.00		8.00	\$.00
A 4959 2 Potash Fertilizer.....	{ P.†	0.60	0.13	0.26		0.99	10.30	0.60	8.70	2.01
A 5202 2 Potash Fertilizer.....		0.67	0.14	0.20		1.01	9.80	0.66	8.94	2.20
A 5249 2 Potash Fertilizer.....		0.66	0.10	0.22		0.98	9.45	0.44	8.01	2.10
Average.....		0.64	0.12	0.23		0.99	9.45	0.57	8.88	2.10
XXX Fertilizer.	{ G.†						18.00		18.00	\$.00
A 5248	{ P.†						12.90	1.06	11.84	2.00
Packers Boars Head Brands										
Ammoniated Bone Phosphate & Potash.	{ G.†					0.88	11.00		10.00	1.00
5327	{ P.†	0.56	0.14	0.25		0.95	11.95	0.84	11.11	1.20
Best Grain Fertilizer.....	{ G.†					1.65	19.00		18.00	\$.00
A 4904	{ P.†	1.33	0.18	0.13		1.64	13.75	1.28	12.47	3.14

†Abbreviations for Guaranteed and Found.

A 5284	Sure Growth Potash Manure.....	Bancroft.....	{ G. P. }	0.45	0.18	0.30	0.88 0.93	9.90	0.68	8.00 9.22	8.00 3.24
A 4805	Sure Growth Potash Manure 1916.....	Holland.....	{ G. P. }	0.55	0.17	0.24	0.88 0.96	9.50	0.92	8.00 8.58	1.00 1.23
A 5381	Sure Growth Potash Manure 1916.....	Romeo.....	{ G. P. }	0.60	0.12	0.23	0.95	9.60	0.54	9.06	1.13
	Average.....			0.57	0.15	0.24	0.96	9.55	0.73	8.82	1.18
A 5324	2 and 10 Compound.....	Detroit.....	{ G. P. }	1.25	0.41	0.26	1.65 1.92	11.00 12.70	1.28	11.00 10.92	.....
A 5318	World of Good Superphosphate with Potash..	Detroit.....	{ G. P. }	1.36	0.31	0.21	1.65 1.88	9.00 10.00	1.34	8.00 8.66	1.00 1.36
	Michigan State Grange Brands										
	All Crops Special Fertilizer.....		G. P.	.....	.....	.....	0.88	.....	.....	8.00	1.00
	Ammoniated Bone and Potash.....		G. P.	.....	.....	.....	0.88	.....	.....	10.00	1.00
	Corn and Oats Fertilizer.....		G. P.	.....	.....	.....	1.65	.....	.....	10.00	.....
	Grange 1-8-2.....		G. P.	.....	.....	.....	0.88	.....	.....	8.00	8.00
	Grange 1-8-3.....		G. P.	.....	.....	.....	0.88	.....	.....	8.00	8.00
	Grange 2-8-2.....		G. P.	.....	.....	.....	1.65	.....	.....	8.00	8.00
	Grange 2-12-3.....		G. P.	.....	.....	.....	1.65	.....	.....	18.00	8.00
	High Grade Phosphate & Potash.....		G. P.	.....	.....	.....	.....	.....	.....	18.00	8.00
	Wheat Fertilizer Extra.....		G. P.	.....	.....	.....	.....	.....	.....	16.00	.....
	Wheat Fertilizer No. 1.....		G. P.	.....	.....	.....	.....	.....	.....	14.00	.....
	IX Fertilizer.....		G. P.	.....	.....	.....	0.88	.....	.....	10.00	.....
	Anaconda Copper Mining Co., Chicago, Ill.										
A 4941	Anaconda Treble Superphosphate.....	Grand Rapids.....	{ G. P. }	.....	.....	.....	.....	48.50 47.70	2.80	45.50 44.90	.....
	Armour Fertilizer Works, Chicago, Ill.										
A 5234	Ammoniated Phosphate No. 2.....	Blissfield.....	{ G. P. }	1.04	0.32	0.12	1.65 1.88	10.40 11.85	1.06	10.00 10.79	.....
A 5236	Cereal Phosphate.....	Blissfield.....	{ G. P. }	.....	.....	.....	.....	10.40 10.85	0.50	10.00 10.35	.....

†Abbreviations for Guaranteed and Pound.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Insoluble	Organic	Total	Total	Insoluble	Available	Water Soluble
Armour Fertilizer Works—Cont.										
A 4877	Grain Grower.....	{ G.† { P.†	1.22	0.38	0.10	1.65	8.60	0.48	8.00	8.00
A 4902	Grain Grower.....		1.23	0.35	0.16	1.70	9.05	0.64	8.57	2.00
A 5368	Grain Grower.....		1.10	0.26	0.15	1.51	9.25	0.58	8.61	2.25
	Average.....		1.18	0.33	0.14	1.65	9.22	0.57	8.65	2.11
A 4742	Michigan Special.....	{ G.† { P.†	0.57	0.23	0.08	0.88	8.60	1.10	8.00	1.00
A 4777	Michigan Special.....		0.53	0.20	0.08	0.81	9.00	0.66	8.34	1.01
A 4945	Michigan Special.....		0.60	0.20	0.08	0.88	9.45	0.78	8.67	1.15
A 5366	Michigan Special.....		0.50	0.26	0.11	0.87	9.40	0.46	8.94	1.23
	Average.....		0.55	0.22	0.09	0.86	9.21	0.75	8.46	1.14
1-10 Fertilizer.....										
	Phosphate & Potash Special.....	{ G.†				0.88			10.00	
A 4884	Special Grain Grower.....	{ G.† { P.†	1.30	0.28	0.09	1.65	8.60	0.62	8.00	1.00
	Standard.....		0.64	0.25	0.04	0.88	8.60	0.62	8.00	1.00
A 4776	Standard.....		1.28	0.27	0.05	1.60	8.85	0.62	8.23	2.87
A 4986	Standard.....		0.93	0.25	0.06	0.94	9.40	0.52	8.88	2.92
A 5271	Standard.....	{ G.† { P.†	0.51	0.23	0.12	0.86	9.60	0.52	9.08	2.19
A 5367	Standard.....		0.74	0.25	0.07	1.06	9.10	0.58	8.52	2.73
	Average.....		0.74	0.25	0.07	1.06	9.24	0.56	8.68	2.85
A 5414	Star Phosphate.....		{ G.† { P.†							14.00
	Wheat, Corn & Oats Special.....	{ G.† { P.†	0.75	0.22	0.05	0.88	7.60	0.46	7.00	1.00
5415			0.75	0.22	0.05	1.02	9.10	0.46	8.04	1.20

**ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.**

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid		Potash	
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble		Available
Armour Fertilizer Works—Cont.										
"Big Crop" Brands—Cont.										
A 4888	10-8 Fertilizer.....	Buchanan.....	{ G†			.....	10.60	.....	10.00	8.00
			{ F†			.....	11.00	0.42	10.58	7.58
A 4842	10-10 Fertilizer.....	Hudsonville.....	{ G†			.....	10.60	.....	10.00	10.00
A 4876	10-10 Fertilizer.....	Coloma.....	{ F†			.....	11.45	0.20	11.24	9.28
		Average.....				.....	11.55	0.20	11.35	9.30
						.....	11.50	0.20	11.30	9.34
A 4843	12-2 Fertilizer.....	Hudsonville.....	{ G†			.....	12.60	.....	12.00	8.00
A 5272	12-2 Fertilizer.....	Hudson.....	{ F†			.....	12.50	0.50	12.00	2.04
A 5233	12-2 Fertilizer.....	Blissfield.....				.....	13.10	0.80	12.30	1.88
		Average.....				.....	12.55	0.62	11.93	2.00
						.....	12.72	0.57	12.15	1.95
A 4743	12-4 Fertilizer.....	St. Johns.....	{ G†			.....	12.60	.....	12.20	4.00
A 4844	12-4 Fertilizer.....	Hudsonville.....	{ F†			.....	12.85	0.56	12.29	4.08
A 4946	12-4 Fertilizer.....	Sunfield.....				.....	13.05	0.66	12.39	4.11
A 5235	12-4 Fertilizer.....	Blissfield.....				.....	13.50	0.58	12.92	4.27
A 5365	12-4 Fertilizer.....	Imlay City.....				.....	12.90	0.57	12.33	4.10
A 5366	12-4 Fertilizer.....	Leansburg.....				.....	13.30	0.42	12.88	3.99
A 5394	12-4 Fertilizer.....	Average.....				.....	13.60	0.52	13.08	4.11
						.....	13.20	0.55	12.65	3.99
A 4882	Kainit*.....	Bridgman.....	{ G†			.....	.....	.....	.....	14.00
			{ F†			.....	.....	.....	.....	14.62
Tuscarora Brands										
A 4887	Acid Phosphate.....	New Buffalo.....	{ G†			.....	14.60	.....	14.00	.....
			{ F†			.....	14.80	0.46	14.34	.....
	10% Acid Phosphate.....	G†				.....	.....	.....	16.00	.....

A 5410	Potash & Phosphate	Utica	{ G. P.						10.60 12.35	0.34	10.00 12.01	1.00 0.83
A 4889	Special Corn, Wheat & Bean Grower	New Buffalo	{ G. P.	0.48	0.27	0.04	0.82	8.60	8.00		8.00	1.00
A 5409	Special Corn, Wheat & Bean Grower	Utica	{ G. P.	0.58	0.22	0.07	0.79	9.25	8.20	0.96	8.20	1.00
		Average		0.53	0.25	0.05	0.87	8.85	7.99	0.86	7.99	1.28
	The Barrett Co., New York, N. Y.						0.83	9.05	8.14	0.91	8.14	1.19
A 4741	Arcadian Sulphate of Ammonia	Tecumseh	{ G. P.				80.75					
A 4846	Arcadian Sulphate of Ammonia	Fennville	{ G. P.				21.32					
		Average					21.31					
A 5019	Blood & Bone	Battle Creek	{ G. P.	2.32	2.00	0.99	5.86	13.17				
	N. Burleson, Swartz Creek, Mich.						5.31	19.70				
A 5289	Economy	Swartz Creek	{ G. P.	1.14	0.44	0.19	1.65	12.68	10.00	3.01	9.67	2.00 2.52
A 4831	Meat & Bone Phosphate	St. Joseph	{ G. P.	0.84	2.07	1.33	4.75	14.00	6.00		6.00	
	Calumet Fertilizer Co., New Albany, Ind.						4.84	12.70	6.20	6.50	6.20	
A 5478	Bone Phosphate & Potash Mixture	Millington	{ G. P.	0.21	0.12	0.12	0.41	11.00	10.00		10.00	1.00
A 5450	Coburn's Special with Potash	Kingston	{ G. P.	0.34	0.14	0.06	0.45	10.80	10.09	0.71	10.09	0.99
A 5397	Corn & Wheat Special	Mason	{ G. P.	1.34	0.22	0.22	0.60	9.60	8.60	0.44	8.60	0.60
							0.54	9.10	11.79	1.06	11.79	2.13
							1.68	12.85				

†Abbreviations for Guaranteed and Found.

*Shipped under 1920 License.

A 5347	14% Acid Phosphate*	Mt. Morris	(G.† F.†)						15.00 15.26	0.24	14.00 15.26	
A 5340	16% Acid Phosphate	Flushing	(G.† F.†)						17.00 18.60	0.02	16.00 18.58	
A 5016	Half-Seven-Ten*	Neeley	(G.† F.†)	0.27	0.08	0.09	0.47 0.44	8.00 8.35	1.54		7.00 6.81	10.00 10.27
A 4923 A 5218	Half-Eight-Three* Half-Eight-Three*	Zealand Dundee	(G.† F.†)	0.25 0.37	0.10 0.09	0.11 0.08	0.47 0.46 0.54	9.00 9.55 9.13	1.44 1.51		8.00 8.51 7.62	8.00 2.97 3.01
		Average		0.31	0.10	0.09	0.50	9.54	1.48		8.06	2.99
A 5461	Cincinnati Plant Food Co., Cincinnati, O. Nurto Pulverized Sheep Manure	Dearborn	(G.† F.†)	0.48	0.38	1.15	2.00 2.01	1.00 1.35				1.50 2.42
	Columbia Guano Company, Toledo, O.											
	Columbia 16% Acid Phosphate		G.†								16.00	
	Columbia Bountiful Guano		G.†				1.60				12.00	2.00
	Columbia Glory Brand		G.†				0.80				12.00	
	Columbia Goodwill Guano		G.†				0.80				8.00	1.00
	Columbia Special Fish Guano		G.†				0.80				11.00	2.00
	Columbia 12-2 Phosphate and Potash		G.†								12.00	2.00
A 4728 A 5242	16% Acid Phosphate 16% Acid Phosphate	Tecumseh Brighton	(G.† F.†)					18.15 19.00	2.16 2.88		16.00 16.12	
		Average						18.58	2.52		16.06	
A 4186 A 4729 A 4879 A 5369 A 5393	Big Potash Big Potash Big Potash Big Potash Big Potash	Grand Rapids Tecumseh Benton Harbor Imlay City Laingsburg	(G.† F.†)	0.17 0.21 0.20 0.10 0.26	0.31 0.29 0.25 0.31 0.28	0.32 0.36 0.34 0.39 0.32	0.82 0.80 0.80 0.79 0.80	10.00 10.95 10.80 12.00 11.10	2.42 1.68 1.82 2.18 1.68		8.00 8.53 10.14 8.98 9.42	10.00 10.14 10.04 8.47 10.01 10.79
		Average		0.19	0.29	0.34	0.82	11.15	1.96		9.19	9.89

*Abbreviations for Guaranteed and Found.

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ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
A 5436	Darling & Co.—Cont. Bone & Acid Phosphate $\frac{1}{2}$ and $\frac{1}{4}$	Frankenmuth	0.47	0.53	0.24	0.82 1.24	85.00 24.95	13.35	18.00 11.60	.....
			0.93 0.89	0.44 0.45	0.26 0.32	1.65 1.63 1.66	10.00 10.75 10.65	1.50 1.90	8.00 9.25 8.75	2.00 2.06 2.10
A 4730 A 4780	Chicago Brand Chicago Brand	Tecumseh Flint	0.91	0.45	0.29	1.65	10.70	1.70	9.00	2.08
A 4187 A 4793 A 4890	Farmer's Favorite Farmer's Favorite Farmer's Favorite	Grand Rapids Ypsilanti Benton Harbor	0.33 1.01 0.91	0.92 0.68 0.89	0.41 0.44 0.50	1.47 1.66 2.13 2.30	10.00 12.25 11.65 11.20	2.02 2.06 1.82	8.00 10.23 9.59 9.38	4.00 3.10 3.87 3.48
			0.75	0.83	0.45	2.03	11.70	1.97	9.73	3.47
A 5400	General Crop	Morenci	1.01	0.44	0.21	1.66	14.00 14.40	0.88	12.00 13.52	.....
			0.59 0.46 0.69	0.28 0.29 0.30	0.41 0.13 0.12	0.88 1.28 1.11	11.00 11.60 12.75 13.05	2.10 2.02 1.68	8.00 9.50 10.73 11.37	1.00 2.06 1.31 1.06
A 5035 A 4794	Little Giant Muriale of Potash	Holland Ypsilanti	0.58	0.29	0.22	1.09	12.47	1.93	10.54	1.49
			0.34	0.36	0.24	0.89 0.94	12.00 12.75	1.15	10.00 11.60	.....
A 4794	Muriale of Potash	Ypsilanti	0.34	0.36	0.24	0.89 0.94	12.00 12.75	1.15	10.00 11.60	.....
			0.34	0.36	0.24	0.89 0.94	12.00 12.75	1.15	10.00 11.60	60.00 51.32

A 4188	Pulverised Sheep Manure.....	{G†	0.72	0.42	1.12	1.85	1.00	1.00
A 4759	Pulverised Sheep Manure.....	{F†	0.49	0.50	1.34	2.40	1.73	2.08
A 4946	Pulverised Sheep Manure.....		1.02	0.62	1.49	1.09	1.68	1.38
	Average.....		0.74	0.51	1.32	2.57	1.14	1.40
A 4758	Pure Ground Bone.....	{G†	0.15	1.19	0.71	1.85	1.00	1.00
		{F†				28.10		
A 4731	Sure Winner.....	{G†	0.20	0.30	0.33	0.88	10.00	5.00
A 5270	Sure Winner.....	{F†	0.24	0.33	0.37	0.83	10.75	8.95
A 5427	Sure Winner.....		0.12	0.37	0.39	0.94	10.35	8.43
	Average.....		0.19	0.33	0.36	0.88	10.65	8.83
A 5392	Ten Five.....	{G†				10.00	10.00	5.00
A 5417	Ten Five.....	{F†				13.55	10.77	4.47
	Average.....					13.15	11.91	4.36
The Diamond Fertilizer Co., Sandusky, O.								
A 4834	Diamond Acid Phosphate.....	{G†				17.00	16.00	
A 5207	Diamond Acid Phosphate.....	{F†				17.30	16.22	
A 5418	Diamond Acid Phosphate.....					17.60	15.86	
	Average.....					16.80	15.81	
	Diamond Ammoniated Phosphate.....	{G†				17.23	15.96	
		{F†						
A 5343	Diamond Black Soil Special.....	{G†				11.00	10.00	4.00
		{F†				10.98	10.00	3.65
A 5456	Diamond Economy Brand.....	{G†	1.28	0.20	0.08	15.00	12.00	8.00
		{F†				13.30	12.01	2.04
A 4835	Diamond General Grower.....	{G†	0.34	0.08	0.00	11.00	10.00	1.00
A 5206	Diamond General Grower.....	{F†	0.26	0.10	0.03	11.15	10.33	1.01
A 5231	Diamond General Grower.....		0.37	0.08	0.00	11.00	10.12	1.00
	Average.....		0.32	0.09	0.01	10.95	10.05	0.99
A 5224	Diamond Guano.....	{G†	0.60	0.13	0.01	11.03	10.16	0.97
		{F†				11.00	10.00	1.00
						10.85	9.97	1.13

†Abbreviations for Guaranteed and Found.

**ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.**

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
The Diamond Fertilizer Co.—Cont.										
A 4836	Diamond Phosphate & Humus	Alto	0.26	0.12	0.06	0.41	13.00	1.04	12.96	.....
A 5225	Diamond Phosphate & Humus	Deerfield	0.32	0.17	0.06	0.44	14.00	1.51	12.49	.....
A 5269	Diamond Phosphate & Humus	Hudson	0.24	0.18	0.02	0.44	13.80	0.98	12.82	.....
		Average	0.27	0.16	0.03	0.46	13.93	1.18	12.75	.....
Diamond Phosphate & Potash										
A 5342	Diamond Phosphate & Potash	Mt. Morris	.....	.....	.....	.....	11.00	1.17	9.98	2.00
Diamond Truck Special										
A 5208	Diamond Truck Special	Ypsilanti	0.64	0.10	0.03	0.82	9.00	0.56	8.00	4.00
A 5229	Diamond Truck Special	Blissfield	0.80	0.10	0.03	0.90	9.10	0.70	8.54	3.84
		Average	0.72	0.10	0.02	0.84	8.88	0.63	8.25	3.98
Extra Truck Special										
A 5268	Extra Truck Special	Hudson	0.73	0.10	.....	0.83	10.00	0.82	9.00	7.00
			.....	.....	.....	.....	10.65	.....	9.83	6.31
Earp-Thomas Cultures Corp., New York, N. Y.										
	Stimulant Tablets	G.†	.....	.....	.....	11.00	.....	.....	18.00	15.00
Elliot, The Florist, Gary, Ind.										
	Elliot's Plant Food	G.†	.....	.....	.....	3.50	.....	.....	7.50	6.50

Federal Chemical Co.,
Louisville, Ky.

A 5035	A-1 Fertilizer.....	Jamestown.....	{ G† P†	0.28	0.33	0.22	0.83	13.05	0.70	12.00	.....
	A-1 Formula.....		G†				1.65			10.00	.....
A 5021	Black Land Special.....	Kent City.....	{ G† P†					12.43	0.88	12.00	4.00
A 5475	Black Land Special.....	Chesaning.....	{ P†					11.85	0.66	11.55	2.08
		Average.....								11.19	3.55
								12.14	0.77	11.37	3.33
A 4860	Braden Formula.....	Wayland.....	{ G† P†	0.74	0.10	0.07	0.82	11.90	0.72	11.00	5.00
A 4864	Braden Formula.....	South Haven.....	{ P†	0.60	0.10	0.10	0.91	11.60	0.64	11.18	2.87
A 5024	Braden Formula.....	Moline.....		0.57	0.10	0.14	0.80	11.63	0.66	10.96	2.49
A 5031	Braden Formula.....	Burr Oak.....		0.59	0.08	0.16	0.81	11.35	0.58	10.97	2.55
		Average.....					0.83			10.77	3.00
				0.63	0.09	0.12	0.84	11.62	0.65	10.97	2.65
	Daybreak Champion Potash Fertilizer.....		G†							8.00	2.00
A 5388	Daybreak Favorite.....	Vernon.....	{ G† P†	0.46	0.17	0.21	0.82	12.15	1.16	11.00	3.00
	1st Prize Formula.....		G†				0.82			10.99	2.15
	Globe Tip Top Potash Fertilizer.....		G†							11.00	3.00
	Half & Half Meal Mixture.....		G†							8.00	2.00
A 5026	High Grade Fertilizer.....	Richland.....	{ G† P†				1.65			10.00	.....
				0.31	0.17	0.08	1.65	14.20	0.88	12.00	.....
							0.65			13.32	.....
A 4197	High Grade Phosphate.....	Zeeland.....	{ G† P†					15.70	0.43	16.00	.....
A 4824	High Grade Phosphate.....	Nunica.....	{ P†					16.95	0.30	16.37	.....
A 4849	High Grade Phosphate.....	Pennville.....						17.80	0.62	16.65	.....
A 4926	High Grade Phosphate.....	Grand Rapids.....						17.00	0.38	17.18	.....
A 5380	High Grade Phosphate.....	Romeo.....						17.20	0.20	16.62	.....
A 5390	High Grade Phosphate.....	Vernon.....						18.20	0.30	17.00	.....
		Average.....						17.14	0.37	16.77	.....
	Liberty Grain Grower.....		G†				0.41			10.00	.....

Abbreviations for Guaranteed and Found.

A 5041	Pure Bone.....	{ G. P.†	0.29	0.45	0.36	1.00 1.12	\$0.00 31.70	.....	.....	.....	.....	.....
	Royal Phosphate.....	G.†	.....	.....	.....	.....	.....	.....	.....	14.00	.....	.....
A 4900	Special Manure.....	{ G. P.†	0.67	0.09	0.08	0.88	10.55	0.58	10.00	10.00	8.00	.....
A 5097	Special Manure.....	{ G. P.†	0.62	0.13	0.15	0.86	10.65	0.84	10.97	10.97	2.00	.....
A 5369	Special Manure.....	{ G. P.†	0.34	0.20	0.26	0.83	10.93	1.06	10.01	10.01	1.77	.....
A 5411	Special Manure.....	{ G. P.†	0.23	0.27	0.22	0.72	10.45	0.44	10.01	10.01	2.02	.....
A 5454	Special Manure.....	{ G. P.†	0.42	0.10	0.08	0.66	10.50	0.60	9.90	9.90	1.85	.....
	Average.....		0.46	0.16	0.16	0.78	10.68	0.66	10.02	10.02	1.97	.....
A 4976	Special Phosphate Mixture.....	{ G. P.†	.....	.....	.....	.....	\$0.00	.....	10.00	10.00	.....	.....
A 5253	Special Phosphate Mixture.....	{ G. P.†	.....	.....	.....	.....	21.30	9.60	11.70	11.70	.....	.....
A 5453	Special Phosphate Mixture.....	{ G. P.†	.....	.....	.....	.....	21.70	9.65	12.05	12.05	.....	.....
	Average.....		.....	.....	.....	.....	19.30	5.90	13.40	13.40	.....	.....
A 4924	Standard Crop & Tobacco Grower.....	{ G. P.†	0.44	0.14	0.23	0.88	20.77	8.38	12.39	12.39	.....	.....
A 5449	Standard Crop & Tobacco Grower.....	{ G. P.†	0.39	0.11	0.17	0.81	8.65	0.36	8.29	8.29	4.00	.....
	Average.....		0.41	0.13	0.20	0.74	10.65	0.54	10.11	10.11	4.04	.....
	Standard Meal Mixture.....	G.†	.....	.....	.....	.....	9.65	0.45	9.20	9.20	8.66	.....
A 4938	Standard Wheat & Corn Maker.....	{ G. P.†	0.23	0.09	0.09	0.41	10.28	0.74	11.60	11.60	0.60	.....
A 5361	Standard Wheat & Corn Maker.....	{ G. P.†	0.19	0.15	0.14	0.43	11.33	0.46	9.84	9.84	1.39	.....
A 5412	Standard Wheat & Corn Maker.....	{ G. P.†	0.13	0.09	0.12	0.34	13.10	0.46	10.87	10.87	0.66	.....
	Average.....		0.18	0.11	0.12	0.41	11.57	0.55	11.08	11.08	0.90	.....
A 4199	10% Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	12.00	.....	6.00	6.00	10.00	.....
A 4925	10% Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	11.80	2.42	9.38	9.38	6.43	.....
	Average.....		.....	.....	.....	.....	12.60	1.68	10.92	10.92	8.89	.....
A 4198	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	12.20	2.05	10.15	10.15	6.19	.....
A 4948	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	11.50	.....	10.00	10.00	10.00	.....
A 4952	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	10.60	0.82	10.48	10.48	7.09	.....
A 4920	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	10.90	0.91	9.99	9.99	8.83	.....
A 4939	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	12.12	0.60	10.30	10.30	7.30	.....
A 5063	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	12.15	0.76	11.39	11.39	5.97	.....
A 5062	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	11.80	0.70	11.04	11.04	7.19	.....
A 5032	Ten Ten Potash Fertilizer.....	{ G. P.†	.....	.....	.....	.....	10.80	0.60	10.26	10.26	6.39	.....
	Average.....		.....	.....	.....	.....	12.50	0.84	11.66	11.66	9.50	.....
			.....	.....	.....	.....	10.83	1.02	9.81	9.81	7.63	.....
			.....	.....	.....	.....	11.39	0.79	10.60	10.60	.....	.....

†Abbreviations for Guaranteed and Found.
 **Not included in average.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
A 4899 A 4975	Federal Chemical Co.—Cont. Wheat & Grain Special. Wheat & Grain Special.	Kent City.....	0.71	0.11	0.11	0.82	12.70	0.56	12.00	1.00
		Middleton.....	0.63	0.14	0.10	0.87	12.53	0.60	12.14	1.22
		Average.....	0.67	0.12	0.11	0.90	12.62	0.58	11.93	1.21
A 5288	Gleaner Clearing House Assn., Grand Rapids, Michigan Gleaner 14% Acid Phosphate.	.....	.....	.....	.....	.....	.....	.....	14.00	.....
		Swartz Creek.....	.....	.....	.....	.....	16.50	0.26	16.00	.....
		.....	.....	.....	.....	.....	17.80	.....	17.54	.....
A 5465	Gleaner Bean & Corn Grower. Gleaner General Grower. Gleaner Grain Grower. Gleaner Grain Special.	Danville.....	0.62	0.23	0.05	0.82	10.40	0.62	10.00	1.00
		.....	.....	.....	.....	0.82	11.90	.....	11.28	1.90
		.....	.....	.....	.....	.....	.....	.....	8.00	1.00
A 5017 A 5287	Gleaner Phosphoric Acid & Potash. Gleaner Phosphoric Acid & Potash.	Doster.....	.....	.....	.....	.....	10.60	0.48	10.00	2.00
		Swartz Creek.....	.....	.....	.....	.....	9.50	0.46	9.02	1.89
		Average.....	.....	.....	.....	.....	10.60	0.46	10.14	2.02
A 5286	Gleaner Wolverine Pride.	Swartz Creek.....	0.91	0.31	0.10	0.82	10.03	0.47	9.58	1.81
		.....	.....	.....	.....	1.32	8.60	0.96	8.00	2.00
							10.20		9.24	1.16

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble	As Inactive Insoluble	Total	Total	Insoluble	Available	
A 5337 A 5487	International Agricultural Corp.—Cont. Buffalo Brands—Cont. High Grade Acid Phosphate. High Grade Acid Phosphate.	Allegan.....	.....	.....	.....	.....	19.00	.....	18.00	.....
		Brooklyn.....	.....	.....	.....	.....	19.50	1.14	18.36	.....
		Average.....	.....	.....	.....	.....	20.90	1.94	18.96	.....
		.....	.....	.....	.....	.....	20.20	1.54	18.66	.....
A 5486	Ideal.....	Brooklyn.....	1.09	0.41	0.31	1.81	11.00	2.62	10.00	4.00
A 5363	Phosphate & Potash.....	Dryden.....	.....	.....	.....	.....	13.00	1.46	11.18	4.12
A 4943	Sixteen Per Cent.....	Caledonia.....	.....	.....	.....	.....	14.00	.....	12.54	2.04
A 4917	Ten Eight.....	Portage.....	.....	.....	.....	.....	17.00	2.06	16.00	.....
A 5363	Ten Eight.....	Dryden.....	.....	.....	.....	.....	19.50	.....	17.44	.....
A 5416	Ten Eight.....	Mt. Clemens.....	.....	.....	.....	.....	11.00	0.92	10.00	8.00
A 4972 A 5364 A 5408	Three Eight One.....	Average.....	.....	.....	.....	.....	11.75	0.94	10.78	8.38
		.....	.....	.....	.....	.....	11.85	1.00	10.85	8.45
		.....	.....	.....	.....	.....	11.77	0.95	10.81	8.07
		.....	.....	.....	.....	.....	11.77	0.95	10.82	8.30
A 4808	Two Eight Ten.....	Hart.....	0.41	0.23	0.16	0.80	9.00	.....	8.00	1.00
		Dryden.....	0.37	0.24	0.22	0.83	9.30	1.20	8.10	4.00
		Utica.....	0.49	0.20	0.17	0.86	9.60	1.22	8.38	4.26
		Average.....	0.43	0.22	0.18	0.83	9.60	1.56	8.04	4.33
A 5039	Vegetable & Potato.....	Hudsonville.....	0.87	0.37	0.32	1.56	9.50	1.33	8.17	4.19
		Kalamazoo.....	1.61	0.54	0.26	2.41	9.00	.....	8.00	10.00
A 5039	Vegetable & Potato.....	.....	.....	.....	.....	.....	9.65	1.56	8.09	10.17
		.....	.....	.....	.....	.....	9.60	1.60	8.00	6.00
A 5039	Vegetable & Potato.....	.....	.....	.....	.....	.....	9.60	.....	8.00	6.10

I. A. C. Brands											
A 4940	Acid Phosphate.....	Rockford	{ G.†						17.00	2.18	16.00
	Alkaline.....		G.†						19.20		17.02
	Corn & Grain.....		G.†					1.60			12.00
	Crop Producer.....		G.†					1.60			12.00
	Early Harvest.....		G.†					1.60			12.00
	Steamed Bone.....		G.†					0.80	\$9.00		10.00
	Nitrate Soda.....		G.†					15.00			4.00
The Jarecki Chemical Co., Sandusky, O.											
A 4830	Acid Phosphate.....	Conklin	{ G.†								16.00
A 4950	Acid Phosphate.....	Belding	{ F.†						17.50	0.84	16.66
A 5222	Acid Phosphate.....	Petersburg							18.50	1.42	17.08
		Average.....							17.30	0.60	16.70
A 5443	Ammoniated Phosphate.....	Reese	{ G.†	0.36	0.35	0.09		0.88	17.77	0.95	16.82
	Bone Meal.....		G.†					0.80	11.00		10.00
A 5426	Bone Meal.....	Mason	{ G.†	0.85	1.36	0.93		1.65	\$7.00		
	Bone Meal & Acid Phosphate.....		G.†					2.60	24.00		
								3.14	12.80		
A 5424	Clay Soil Special.....	Mason	{ G.†	1.49	0.21	0.07		1.65	13.00		12.00
A 5441	Clay Soil Special.....	Reese	{ F.†	1.39	0.19	0.12		1.77	14.40	1.18	13.22
		Average.....		1.44	0.20	0.10		1.70	14.35	1.00	13.35
	C. O. D. Phosphate.....		G.†					1.74	14.38	1.09	13.29
A 4810	High Potash Manure.....	Hudsonville	{ G.†	1.54	0.15	0.26		1.65	8.00		10.00
			{ F.†					1.95	9.95	2.77	10.23

†Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen						Phosphoric Acid		Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble	
The Jarecki Chemical Co.—Cont.											
A 4750	Lake Erie Guano with Phosphate and Potash.	{ Ovid. Conklin. Belding. Mason. Average.	0.63	0.10	0.10	0.83	18.00	1.42	11.00	1.00	
A 4831	Lake Erie Guano with Phosphate and Potash.		0.93	0.23	0.06	1.22	12.90	1.02	11.48	1.03	
A 4947	Lake Erie Guano with Phosphate and Potash.		0.65	0.15	0.10	0.90	12.15	2.46	11.13	1.45	
A 5423	Lake Erie Guano with Phosphate and Potash.		0.58	0.17	0.12	0.87	13.80	2.06	11.34	1.00	
			0.70	0.16	0.10	0.96	13.50	2.06	11.44	1.00	
			0.35	0.07	0.07	0.49	13.09	1.74	11.35	1.12	
A 4752	Little Giant.	{ Ovid. Belding. Blaisfield. La Salle. Average.	0.35	0.07	0.07	0.41	11.00	1.14	10.00	1.00	
A 4949	Little Giant.		0.32	0.07	0.10	0.49	11.80	1.16	10.66	0.87	
A 5230	Little Giant.		0.43	0.07	0.10	0.60	12.25	1.10	11.09	1.00	
A 5256	Little Giant.		0.41	0.03	0.08	0.52	11.60	1.10	10.50	0.85	
			0.38	0.06	0.09	0.53	11.35	1.42	9.93	0.65	
			0.38	0.06	0.09	0.53	11.75	1.20	10.55	0.84	
A 4751	Middle West Formula.	{ Ovid. Hudsonville.	1.23	0.11	0.21	1.65	15.00	1.52	15.00	2.00	
A 4809	Middle West Formula.		1.28	0.14	0.18	1.55	14.20	2.18	12.68	2.40	
		Average.	1.25	0.13	0.20	1.60	14.08	1.85	11.90	2.21	
			0.68	0.04	0.11	0.82	14.14	1.85	12.29	2.21	
A 4948	Number One Formula.	{ Belding. Dutton. Davison. Vassar. Average.	0.68	0.04	0.11	0.82	9.00	1.16	8.00	2.00	
A 4942	Number One Formula.		0.88	0.05	0.10	0.83	9.40	1.00	8.24	2.01	
A 5351	Number One Formula.		0.58	0.06	0.12	0.76	9.60	1.00	8.60	2.05	
A 5448	Number One Formula.		0.69	0.06	0.11	0.86	9.65	1.10	8.55	2.05	
			0.66	0.06	0.11	0.86	9.80	1.04	8.76	2.05	
			0.66	0.05	0.11	0.82	9.61	1.08	8.53	2.03	
A 5223	One-Nine-Seven.	{ Petersburg	0.83	0.06	0.12	0.88	10.00	2.61	9.00	7.00	
	Phosphate with Humus.		0.83	0.06	0.12	1.01	10.43	2.61	7.83	7.54	
					0.41			18.00			

A 4948	Special Sugar Beet Grower.....	{G.† F.†	0.38	0.07	0.10	0.41 0.55	11.00 12.45	1.12	10.00 13.33	1.00 1.02
A 5349	Square Brand Phosphate & Potash.....	{G.† F.†					11.00 13.10	1.40	10.00 11.70	1.00 2.80
A 5440	Square Brand Phosphate & Potash.....	{G.† F.†					11.75	1.82	9.93	2.22
	Average.....						12.43	1.61	10.82	2.51
A 5350	Super Phosphate and Potash.....	{G.† F.†					11.00		10.00	4.00
A 5431	Super Phosphate and Potash.....	{G.† F.†					12.40	1.58	10.82	3.77
A 5442	Super Phosphate and Potash.....	{G.† F.†					11.95	1.34	10.61	4.12
	Average.....						11.83	1.42	10.43	3.66
A 5425	Tobacco and Potato Food.....	{G.† F.†	0.81 0.68	0.09 0.12	0.12 0.22	0.88 1.02	9.00 10.55	2.00	8.00 8.55	4.00 4.27
A 5435	Tobacco and Potato Food.....	{G.† F.†				1.02	9.55	2.46	7.09	4.54
	Average.....		0.75	0.10	0.17	1.02	10.05	2.23	7.82	4.41
A 4807	Truck Special.....	{G.† F.†					9.00 10.55	2.44	8.00 8.11	10.00 10.44
	The Michigan Humus & Chemical Co., Chassell, Michigan									
	Humasol.....	G.†				0.75			0.01	0.05
	Michigan State Farm Bureau, Lansing, Michigan									
A 4781	Acid Phosphate.....	{G.† F.†					17.00	1.64	16.00	
A 4913	Acid Phosphate.....	{G.† F.†					18.00	1.36	16.36	
A 4962	Acid Phosphate.....	{G.† F.†					19.10	2.08	17.04	
A 5210	Acid Phosphate.....	{G.† F.†					19.60	1.52	18.08	
	Average.....						17.50	1.02	16.48	
A 4785	Black Land Special.....	{G.† F.†					18.55	1.56	16.99	
A 4908	Black Land Special.....	{G.† F.†					9.00		8.00	10.00
A 4912	Black Land Special.....	{G.† F.†					8.85	0.80	8.05	11.64
A 5214	Black Land Special.....	{G.† F.†					10.00	0.92	9.08	10.74
	Average.....						9.65	0.96	8.69	10.41
							9.55	1.04	8.51	10.48
							9.51	0.93	8.58	10.82

†Abbreviations for Guaranteed and Found.

A 5463	Wizard Brand Hog Manure.....	G.†	.....	.....	.....	1.80	.....	.....	1.00	1.00
	Wizard Brand Mixed Manure.....	G.†	.....	.....	.....	1.80	.....	.....	1.00	1.00
	Wizard Brand Sheep Manure.....	{ G.† F.†	.....	0.47	1.27	1.80 2.06	1.00 1.15	0.18	1.00 0.97	1.00 2.13
	The Queen City Fertilizer Co., Cincinnati, O.									
A 5402	Special Sugar Beet Grower.....	{ G.† F.†	.....	0.11	0.10	0.88 0.95	9.00 9.85	1.32	8.00 8.53	2.00 2.06
	Rasin-Monumental Company, Cincinnati, O.									
A 5398	Rasin's 16% Acid Phosphate.....	{ G.† F.†	.....	.....	.....	.....	17.80 17.80	0.46	16.00 17.34	.....
	Read Phosphate Co., New Albany, Ind.									
A 4768	Blackland Special.....	{ G.† F.†	.....	.....	.....	.....	9.30 9.50	0.02	8.00 8.98	10.00 9.54
A 4761	Blackland Special.....	{ G.† F.†	.....	.....	.....	.....	9.50 8.55	0.16	8.37 8.37	9.46 10.19
A 4871	Blackland Special.....	{ G.† F.†	.....	.....	.....	.....	11.00	0.86	10.14	9.68
A 4904	Blackland Special.....	{ G.† F.†	.....	.....	.....	.....	.....	.....	.....	.....
	Average.....						9.59	0.46	9.13	8.90
A 4195	Bureau Acid Phosphate.....	{ G.† F.†	.....	.....	.....	.....	17.00 17.30	1.11	16.00 16.19	.....
A 4761	Bureau Acid Phosphate.....	{ G.† F.†	.....	.....	.....	.....	18.60 18.60	2.38	16.22 16.22	.....
A 4822	Bureau Acid Phosphate.....	{ G.† F.†	.....	.....	.....	.....	18.85 18.85	0.16	16.69 16.69	.....
A 4909	Bureau Acid Phosphate.....	{ G.† F.†	.....	.....	.....	.....	18.80	0.32	18.48	.....
	Average.....						17.89	0.99	16.90	.....
A 4193	Clayland Special.....	{ G.† F.†	.....	0.55	0.35	1.80 1.99	13.00 12.95	1.00	12.00 11.95	.....
A 4821	Clayland Special.....	{ G.† F.†	.....	0.62	0.50	1.77 1.77	13.40 13.40	0.80	12.60 12.60	.....
A 5220	Clayland Special.....	{ G.† F.†	.....	0.63	0.38	1.84 1.84	14.20 14.20	2.20	12.00 12.00	.....
A 5244	Clayland Special.....	{ G.† F.†	.....	0.60	0.54	1.71 1.71	13.65 13.65	1.68	11.97 11.97	.....
	Average.....			0.64	0.44	1.73	13.55	1.42	12.13	.....

Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Organic	As Inactive Organic	Total	Total	Insoluble	Available	
Read Phosphate Co.—Cont.										
A 4787	General Crop Grower.....	Ypsilanti..... { F.†	0.84	0.45	0.41	1.60	15.00	0.46	19.00	8.00
A 4818	General Crop Grower.....	Grand Rapids.....	0.59	0.52	0.52	1.70	13.90	1.34	13.44	2.01
A 4968	General Crop Grower.....	Lake Odessa.....	0.98	0.40	0.29	1.63	13.55	2.04	12.21	1.92
A 5221	General Crop Grower.....	Dundee.....	0.32	1.09	0.57	1.87	15.50	4.52	13.46	1.81
A 5255	General Crop Grower.....	Monroe.....	1.52	0.09	0.15	1.98	15.70	2.80	11.18	1.78
	Average.....		0.85	0.51	0.39	1.75	14.63	2.19	11.90	2.16
A 4870	Michigan Special.....	Bangor..... { F.†	1.19	0.32	0.44	1.60	11.00	1.98	10.00	4.00
A 4967	Michigan Special.....	Lake Odessa.....	1.03	0.45	0.29	1.95	11.87	2.74	9.89	6.04
	Average.....		1.11	0.38	0.37	1.86	12.51	2.36	10.15	4.56
A 4872	Muriate of Potash.....	Bangor..... { F.†								48.00
A 4790	Nitrate of Soda.....	Ypsilanti..... { F.†				14.75				51.61
A 4903	One-Eight-One.....	Zeeland..... { F.†	0.35	0.21	0.34	0.80	9.00	5.60	8.00	1.00
A 4819	Special Truck.....	Grand Rapids..... { F.†	1.55	0.47	0.46	2.48	9.10	1.10	8.00	8.00
A 5254	Special Truck.....	Monroe.....	1.71	0.49	0.44	2.64	9.25	1.30	7.95	6.08
	Average.....		1.63	0.43	0.45	2.56	9.18	1.20	7.98	6.45
A 4789	Sulphate of Ammonia.....	Ypsilanti..... { F.†				20.80				
						21.14				

A 4194 A 4762 A 4981 A 5219 A 5243 A 5386	Twelve-Two..... Twelve-Two..... Twelve-Two..... Twelve-Two..... Twelve-Two..... Twelve-Two.....	Zeeland..... Grand Blanc..... Brunswick..... Dundee..... Novi..... Washington.....	{G.† {F.†	18.00 12.70 16.80 17.20 12.35 12.65 14.00	18.00 12.18 5.42 4.34 0.36 0.68 0.28	18.00 12.18 11.88 12.86 11.99 11.97 13.72	2.00 1.83 1.64 1.78 1.61 1.39
	Average.....	Average.....						14.28	1.93	12.35	1.61	
	Nitrate of Soda.....		G.†									
A 4705 A 4733 A 4814	16% Acid Phosphate..... 16% Acid Phosphate..... 16% Acid Phosphate.....	Quincy..... Tecumseh..... Coopersville.....	{G.† {F.†	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	16.60 17.60 17.30 17.65	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
	Average.....	Average.....						17.52	0.98	16.54		
A 4817 A 5216	Black Soil Guano..... Cuckoo Guano..... Cuckoo Guano.....	Coopersville..... Azalia.....	{G.† {F.†	..... .....	..... .....	..... .....	..... .....	8.60 11.10 10.95	..... ..... .....	..... ..... .....	..... ..... .....
	Average.....	Average.....						11.03	1.05	9.98	1.57	
A 5042	Excello Guano.....	Belding.....	{G.† {F.†	..... .....	..... .....	..... .....	..... .....	10.50 11.70	..... .....	10.00 10.10	4.00 4.26
A 5215	Fish, Flesh & Powl.....	Azalia.....	{G.† {F.†	..... .....	..... .....	..... .....	..... .....	8.50 9.75	..... .....	8.00 8.25	3.00 3.10
A 4932 A 5245	Security Brand..... Security Brand.....	Premont..... Plymouth.....	{G.† {F.†	..... .....	..... .....	..... .....	..... .....	12.50 15.00 13.00	..... ..... .....	12.00 12.10 12.16	..... ..... .....
	Average.....	Average.....						14.50	1.82	12.68		
A 4740 A 4816 A 4999 A 5217	Special Fish Guano..... Special Fish Guano..... Special Fish Guano..... Special Fish Guano.....	Tecumseh..... Coopersville..... Cass City..... Azalia.....	{G.† {F.†	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	11.50 13.45 13.55 13.55	..... ..... ..... .....	11.00 11.85 12.03 12.61	2.00 2.13 2.15 2.08
	Average.....	Average.....						13.68	1.55	12.13	2.10	

†Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble	As Inactive Insoluble	Total	Total	Insoluble	Available	
F. S. Royster Guano Co.—Cont.										
A 4736	Trump Guano.....	{ G. P. }	1.05	0.37	0.21	1.63	8.50	1.38	8.00	8.00
A 4812	Trump Guano.....		0.75	0.38	0.26	1.63	10.20	1.36	8.82	7.97
A 4893	Trump Guano.....		0.97	0.32	0.30	1.43	10.55	1.40	9.15	8.01
A 5263	Trump Guano.....		1.12	0.27	0.24	1.63	9.90	1.14	8.76	7.50
	Average.....		0.97	0.34	0.26	1.57	10.35	1.22	9.13	7.75
A 4735	Vim Guano.....	{ G. P. }	1.02	0.27	0.19	1.60	12.50	1.18	18.00	2.00
A 4815	Vim Guano.....		1.05	0.47	0.26	1.43	13.75	1.18	12.57	2.84
A 5246	Vim Guano.....		0.92	0.51	0.25	1.68	13.95	1.94	12.01	2.29
	Average.....		1.00	0.42	0.23	1.65	13.72	1.61	12.11	2.64
A 4734	Wonder Guano.....	{ G. P. }	0.43	0.22	0.15	0.80	8.50	1.24	8.00	5.00
A 4983	Wonder Guano.....		0.63	0.22	0.13	0.98	10.65	0.98	9.41	3.50
A 5262	Wonder Guano.....		0.75	0.21	0.21	1.17	10.95	1.36	9.57	3.00
	Average.....		0.60	0.22	0.16	0.98	10.72	1.19	9.53	3.15
A 4706	2-8-15.....	{ G. P. }	1.01	0.37	0.22	1.60	8.50	1.36	8.00	16.00
A 4850	2-8-15.....		1.06	0.28	0.23	1.60	10.00	1.44	8.64	16.88
A 4851	2-8-15.....		1.04	0.30	0.22	1.57	10.00	1.44	8.66	15.78
A 4852	2-8-15.....		1.09	0.28	0.20	1.57	10.15	1.48	8.67	15.13
A 4853	2-8-15.....		1.03	0.30	0.23	1.56	9.85	1.30	8.65	16.37
A 4854	2-8-15.....		1.06	0.30	0.23	1.64	10.00	1.38	8.62	15.27
A 4855	2-8-15.....		1.13	0.31	0.24	1.64	9.95	1.42	8.53	15.81
A 4856	2-8-15.....		1.18	0.26	0.26	1.68	10.00	1.38	8.62	15.25
A 4857	2-8-15.....		1.10	0.33	0.26	1.70	9.90	1.54	8.36	16.56
A 5252	2-8-15.....		0.97	0.37	0.40	1.74	10.15	1.36	8.79	15.40
	Average.....	1.07	0.31	0.26	1.04	9.99	1.40	8.59	15.79	

A 4990	10-2 Phosphate & Potash	Owendale	{ G† P†				10.60 12.75	0.86	10.00 11.89	2.00 2.17
A 4916	10-8 Phosphate & Potash	Portage	{ G† P†				10.60 13.40	1.58	10.00 11.82	8.00 9.25
A 4737 A 4918	10-10 Phosphate & Potash 10-10 Phosphate & Potash	Tecumseh Portage	{ G† P†				10.50 12.25 13.35	1.46 1.44	10.00 10.79 11.91	10.00 10.17 10.08
	Average						12.80	1.45	11.35	10.13
A 4739 A 5250	12-2 Phosphate & Potash 12-2 Phosphate & Potash	Tecumseh Plymouth	{ G† P†				12.50 14.50 14.95	1.12 1.04	12.00 13.38 13.91	2.00 2.44 2.00
	Average						14.73	1.08	13.65	2.22
A 4738 A 4989 A 5000	12-4 Phosphate & Potash 12-4 Phosphate & Potash 12-4 Phosphate & Potash	Tecumseh Owendale Cass City	{ G† P†				12.50 14.35 14.60 14.70	1.12 0.98 1.10	12.00 13.23 13.62 13.60	4.00 3.75 4.50 4.18
	Average						14.55	1.07	13.48	4.16
A 4813	50-50 Bone & Phosphate	Coopersville	{ G† P†				1.88 20.00 21.40	0.24 0.55 10.80	12.00 10.60	
Smith Agricultural Chemical Co. Columbus, Ohio										
A 4828 A 5267 A 5374	16% Acid Phosphate 16% Acid Phosphate 16% Acid Phosphate	Nunica Maybee Almont	{ G† P†				16.45 16.70 17.80	0.52 0.36 0.40	16.00 15.93 16.34 17.40	
	Average						16.98	0.42	16.56	
A 4827 A 5377	Ammoniated Phosphate & Potash Ammoniated Phosphate & Potash	Nunica Almont	{ G† P†				0.80 10.05 9.30	0.56 0.50	8.00 9.49 8.80	1.00 1.16 1.01
	Average						0.84	0.53	9.15	1.08
A 4825 A 5375	Climax Phosphate Climax Phosphate	Nunica Almont	{ G† P†				10.70 10.45	0.34 0.32	10.00 10.46 10.13	4.00 4.40 3.76
	Average						10.58	0.28	10.30	4.08
A 5376	Crop Producer	Almont	{ G† P†				1.60 13.35	0.80	12.00 12.55	

Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	Water Soluble
A 5266 A 5375	Smith Agricultural Chem. Co.—Cont. Grain Grower..... One Ten..... Phosphate & Potash..... Phosphate & Potash.....	G.†				0.80			14.00	1.00
		G.†				0.80			10.00	
		{ G.† P.†					10.80	0.42	10.38	8.00
		Maybee.....					11.10	0.44	10.66	2.02
		Almont.....								2.17
A 5372 A 4826	Potash Formula..... Potash Formula..... Wheat Maker & Seeding Down..... Elmer D. Smith Company, Adrian, Michigan Chrysaline.....	Average.....					10.95	0.43	10.52	2.10
		{ G.† P.†	0.51 0.44	0.12 0.14	0.25 0.21	0.80 0.88 0.79	9.15 9.80	0.60 1.61	8.00 8.55 8.19	8.00 2.02 1.94
		Average.....	0.48	0.13	0.23	0.84	9.48	1.11	8.37	1.98
		Almont.....	0.12	0.16	0.18	0.40 0.46	13.30	0.74	12.00 12.56	
		Adrian.....				16.00 16.88	24.80	0.00	84.00 24.80	80.00 20.83
A 5237	Sodus Humus Co., Inc., Harbor Beach, Mich. Sodus Humus.....	{ G.† P.†								
		G.†				1.89				

[illegible]

†Abbreviations for Guaranteed and Pounds.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble	As Inactive Insoluble	Total	Total	Insoluble	Available	
Swift & Co. Fert. Works—Cont.										
A 4897	Fruit & Vegetable Grower.....	Decatur.....	1.99	0.21	0.08	2.28	11.00	0.20	10.00	4.00
A 4930	Fruit & Vegetable Grower.....	Muskegon.....	1.54	0.22	0.17	1.93	10.30	0.36	10.10	4.64
A 4956	Fruit & Vegetable Grower.....	Eau Claire.....	1.90	0.24	0.13	2.27	11.60	0.34	11.24	4.14
A 5428	Fruit & Vegetable Grower.....	Clio.....	1.94	0.26	0.15	2.35	11.40	0.80	11.06	3.63
		Average.....	1.85	0.23	0.13	2.21	11.25	0.42	10.83	4.12
A 4795	High Grade Acid Phosphate Fert.....	Denton.....					17.00	0.70	16.00	
A 4868	High Grade Acid Phosphate Fert.....	South Haven.....					17.80	0.82	16.98	
A 4878	High Grade Acid Phosphate Fert.....	Coloma.....					17.65	0.72	16.93	
A 5240	High Grade Acid Phosphate Fert.....	Howell.....					18.10	0.84	17.26	
		Average.....					17.64	0.77	16.87	
A 4700	Pulverized Manure.....	Mason.....	0.07	0.54	1.24	1.85	1.00			2.00
A 4791	Pulverized Manure.....	Ypsilanti.....	0.24	0.35	0.91	1.50	1.10			2.02
A 4867	Pulverized Manure.....	South Haven.....	0.30	0.37	0.96	1.63	2.00			2.04
A 5277	Pulverized Manure.....	Lansing.....	0.18	0.43	1.27	1.88	1.10			2.01
		Average.....	0.20	0.42	1.10	1.72	1.70			1.93
A 4701	Red Steer 1-12-3.....	Mason.....	0.46	0.22	0.13	0.81	12.60		12.00	3.00
A 4797	Red Steer 1-12-3.....	Denton.....	0.62	0.28	0.01	0.91	13.35	1.18	12.17	3.32
A 4952	Red Steer 1-12-3.....	Saranac.....	0.73	0.21	0.00	0.94	14.30	1.08	13.22	4.02
		Average.....	0.60	0.24	0.05	0.89	13.67	1.14	12.53	3.42
A 5276	Red Steer 2-8-2.....	Lansing.....	1.13	0.23	0.21	1.57	9.00		8.00	2.00
A 5437	Red Steer 2-8-2.....	Reese.....	0.83	0.26	0.29	1.38	10.35	0.58	9.79	1.83
		Average.....	0.98	0.25	0.25	1.48	11.10	0.57	10.53	2.56

A 4988	Red Steer 4-8-8	Essexville	{ G. P. }	2.72	0.17	0.12	3.28 3.01	9.00 8.75	8.00 8.53	8.00 7.73
A 5452	Tankage & Bone Phosphate	Kingston	{ G. P. }	0.66	0.19	0.09	0.82 0.94	12.50 13.50	12.00 12.32	.....
A 5439	1-8-2 Fertilizer	Reese	{ G. P. }	0.65	0.20	0.22	0.82 1.07	8.50 10.15	8.00 9.55	2.06
A 4896	1-8-3 Fertilizer	Decatur	{ G. P. }	0.41	0.15	0.23	0.82 0.79	8.50 9.40	8.00	3.00
A 5238	1-8-3 Fertilizer	Manchester	{ G. P. }	0.38	0.16	0.26	0.80 0.88	9.00 9.35	8.00 8.99	3.35
A 5334	1-8-3 Fertilizer	Coruna	{ G. P. }	0.54	0.16	0.18	0.88 0.88	10.35 10.35	9.77	2.47
A 5438	1-8-3 Fertilizer	Reese	{ G. P. }	0.53	0.17	0.18	0.88 0.88	10.35 10.35	9.77	2.47
	Average			0.47	0.16	0.21	0.84	9.53	8.83	3.04
A 4796	1-8-6 Fertilizer	Denton	{ G. P. }	0.51	0.15	0.17	0.82 0.83	8.50 9.40	8.00 8.06	6.00
A 4866	1-8-6 Fertilizer	South Haven	{ G. P. }	0.47	0.15	0.19	0.81 0.81	10.10 10.10	9.06 9.06	4.32
A 4898	1-8-6 Fertilizer	Decatur	{ G. P. }	0.37	0.15	0.27	0.79 0.79	10.10 10.10	1.52 1.52	8.58
A 4954	1-8-6 Fertilizer	Brighton Springs	{ G. P. }	0.46	0.13	0.12	0.71 0.71	8.10 8.10	0.44 0.44	6.53
A 5241	1-8-6 Fertilizer	Brighton	{ G. P. }	0.51	0.14	0.15	0.80 0.80	9.90 9.90	7.66 7.16	6.88
	Average			0.46	0.14	0.18	0.78	9.50	8.56	5.98
A 4895	2-8-15 Fertilizer	Decatur	{ G. P. }	1.49	0.14	0.07	1.65 1.70	9.00 8.35	8.00	15.00
A 4703	2 1/4-29 Bone Meal	Mason	{ G. P. }	0.41	1.16	0.45	1.80 2.02	29.00 28.90	.....	.....
A 4919	2 1/4-29 Bone Meal	Portage	{ G. P. }	0.32	1.14	0.57	2.03 3.03	30.40 30.70	.....	.....
A 5278	2 1/4-29 Bone Meal	Lansing	{ G. P. }	0.33	0.99	0.53	1.85 1.71	30.70 30.80	.....	.....
A 5430	2 1/4-29 Bone Meal	Clio	{ G. P. }	0.08	0.96	0.67	1.71	30.80	.....	.....
	Average			0.28	1.06	0.56	1.90	30.20	.....	.....
A 5444	10-4 Fertilizer	Reese	{ G. P. }	.....	.....	.....	.....	10.50 10.80	10.00 10.50	4.00 4.92
A 5276	10-10 Fertilizer	Lansing	{ G. P. }	.....	.....	.....	.....	11.05 11.20	10.00 10.75	10.00 10.54
A 5446	10-10 Fertilizer	Reese	{ G. P. }	.....	.....	.....	.....	11.20	10.80	6.91
	Average			.....	.....	.....	.....	11.13	10.78	8.53
A 4798	12-2 Fertilizer	Denton	{ G. P. }	.....	.....	.....	.....	12.50 13.08	12.00 12.50	2.00 2.18
A 4951	12-2 Fertilizer	Suranac	{ G. P. }	.....	.....	.....	.....	13.70 13.70	12.96 12.96	2.02 2.02
A 5239	12-2 Fertilizer	Manchester	{ G. P. }	.....	.....	.....	.....	12.95 13.70	12.95 13.70	2.97 2.18
A 5429	12-2 Fertilizer	Clio	{ G. P. }	.....	.....	.....	.....	13.70	12.76	2.18
	Average			.....	.....	.....	.....	13.35	12.55	2.34

Abbreviations for Guaranteed and Found.

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921
EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen				Phosphoric Acid			Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
Virginia-Carolina Chemical Co., Cincinnati, O.										
A 5469	V-C Acid and Potash King.....	Tecumseh..... { P.†	.....	.....	.....	.....	15.60 13.30	2.32	10.00 10.98	4.00 4.38
A 5261	V-C 16% Acid Phosphate.....	Erie..... { P.†	.....	.....	.....	.....	17.60 17.10	0.26 0.30	16.00 16.84	.....
A 5273	V-C 16% Acid Phosphate.....	Pittsford..... Average.....	.....	.....	.....	.....	17.30 17.20	0.30	17.00 16.92	.....
A 4811	V-C 20% Acid Phosphate.....	Coopersville..... { P.†	.....	.....	.....	.....	21.60 22.00	0.30 0.38	20.30 21.62	.....
A 4823	V-C 20% Acid Phosphate.....	Grand Rapids.....	.....	.....	.....	.....	21.30	0.66	20.64	.....
A 5212	V-C 20% Acid Phosphate.....	Milan..... Average.....	.....	.....	.....	.....	21.30 21.63	0.66	20.64	.....
A 4833	V-C Big Potato & Truck.....	Premont..... { G.†	1.64	0.31	0.36	2.47	11.60 12.30	0.56	10.00 11.74	4.00 4.69
A 5260	V-C Big Potato & Truck.....	Erie.....	1.45	0.39	0.47	2.31	10.70	0.46	10.24	4.24
A 5276	V-C Big Potato & Truck.....	Lansing.....	1.61	0.38	0.45	2.44	11.10	0.42	10.68	4.27
A 5471	V-C Big Potato & Truck.....	Tecumseh..... Average.....	1.73	0.30	0.43	2.46	11.60 11.43	0.44	11.16 10.96	4.44 4.41
A 5040	V-C Bone Meal & Phosphate.....	Paw Paw..... { G.†	0.31	0.55	0.24	0.82	23.60	12.32	10.00	.....
A 5020	V-C Champion Corn & Wheat Grower.....	Amble..... { G.†	0.64	0.22	0.15	0.82	9.60	0.34	8.00	2.00
A 5472	V-C Complete Fertilizer.....	Lenawee Junction..... { G.†	1.39	0.27	0.28	1.66	9.60 10.50	0.78	8.00 9.72	2.00 2.16
A 5391	V-C Complete Manure.....	Holly..... { G.†	0.64	0.22	0.07	0.88	9.60 9.80	0.32	8.00 9.48	1.00 1.25

FERTILIZER ANALYSES

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A 5322 A 5470	V-C Monarch Acid & Potash Compound V-C Monarch Acid & Potash Compound	Holly Tecumseh	{ G. F. }						11.50 11.65 12.65	0.98 2.18	10.00 10.67 10.47	8.00 8.04 7.87
	Average								12.15	1.58	10.57	7.76
A 5281	V-C Muriate of Potash	Lansing	{ G. F. }									48.00 50.71
A 5282	V-C Plant Food for Vegetables, Lawns and Flowers	Lansing	{ G. F. }	4.98	0.52	0.60			9.50 11.75	2.12	8.00 9.63	8.00 3.65
A 4775	V-C Pride of the North V-C Prolific Grain Grower	Ann Arbor	{ G. F. }	1.47	0.29	0.30			11.50 11.45	0.86	10.00 10.59	8.00 8.37
A 4905	V-C Rescue Fertilizer	Allegan	{ G. F. }	1.02	0.42	0.34			18.50 13.45	0.90	11.00 12.55	8.00
A 4774 A 5274	V-C Springfall Fertilizer V-C Springfall Fertilizer	Ann Arbor Pittsford	{ G. F. }	1.54 1.59	0.11 0.12	0.09 0.09			15.50 13.10 13.40	0.30 0.20	18.00 12.80 13.20	8.00 2.24 2.56
	Average			1.56	0.12	0.09			13.25	0.25	13.00	2.40
A 5280	V-C Steamed Bone	Lansing	{ G. F. }	0.53	1.27	0.61			8.47 23.30			
A 5401	V-C Sure Grain Producer	Jasper	{ G. F. }	0.52	0.26	0.02			0.88 0.80 15.85	0.32	15.00 15.53	
	The Wayne Soap Company, Detroit, Michigan											
	Fertilo		{ G. F. }						8.70		16.50	
	The Welch Chemical Co., Columbus, O.											
A 4769 A 5457	No. 1—Independent Favorite No. 1—Independent Favorite	Swarts Creek Saline	{ G. F. }	0.33 0.40	0.17 0.15	0.27 0.26			0.88 0.77 0.81	0.36 0.34	11.00 11.12 11.91	8.00 3.32 3.03
	Average			0.36	0.16	0.27			11.88	0.36	11.52	3.13
A 4770 A 5458	No. 2—Independent Bone Meal & Phosphate Mixture No. 2—Independent Bone Meal & Phosphate Mixture	Swarts Creek Saline	{ G. F. }	0.39 0.30	0.18 0.18	0.27 0.26			0.88 0.84 0.74	0.36 0.42	8.00 7.90 9.08	1.00 1.26 0.91
	Average			0.34	0.18	0.27			16.03	7.74	8.29	1.09

ANALYSES OF COMMERCIAL FERTILIZER FOR SPRING SEASON OF 1921 EXPRESSED IN PARTS IN ONE HUNDRED.—Cont.

Laboratory Number	Manufacturer and Trade Name	Sampled at	Nitrogen					Phosphoric Acid		Potash
			As Soluble	As Active Insoluble Organic	As Inactive Insoluble Organic	Total	Total	Insoluble	Available	
The Welsh Chemical Company—Cont.										
A 4771	No. 3—Independent Corn, Wheat, Oats & Clover	Swartz Creek	{ G. F. }	0.14	0.08	0.19	0.41 0.41	9.25	0.98	8.00 8.27
A 4969	No. 3—Independent Corn, Wheat, Oats & Clover	Elmdale		0.13	0.08	0.23	0.44	9.45	0.76	8.60 1.04
A 5355	No. 3—Independent Corn, Wheat, Oats & Clover	Lapeer		0.15	0.09	0.25	0.49	9.20	0.82	8.38 1.09
		Average		0.14	0.08	0.22	0.44	9.30	0.85	8.45 1.05
A 4998	No. 4—Independent Grain Special	Cass City	{ G. F. }	0.63	0.08	0.12	0.83	8.20	0.68	8.00 4.03
A 5419	No. 4—Independent Grain Special	Richmond		0.61	0.08	0.19	0.88	9.45	1.16	8.28 4.28
A 5432	No. 4—Independent Grain Special	Clio		0.70	0.07	0.17	0.94	9.30	0.76	8.54 4.10
		Average		0.64	0.08	0.16	0.88	8.98	0.87	8.11 4.14
A 5476	No. 5—Independent Universal Crop	Merrill	{ G. F. }	1.41	0.31	0.32	1.65 2.04	13.10	0.78	12.00 12.32
A 5477	No. 6—Independent High Grade General Crop	Merrill	{ G. F. }	1.08	0.29	0.23	1.65 1.60	13.50	1.08	12.00 12.42
A 4970	No. 7—Independent Corn & Wheat Special	Elmdale	{ G. F. }	0.73	0.11	0.13	0.82 0.97	9.45	0.76	8.00 2.00
	No. 8—Independent Potash Mixture		G.							10.00 2.00
A 5356	No. 9—Independent Ammoniated Phosphate	Lapeer	{ G. F. }	0.07	0.08	0.17	0.41 0.32	13.10	1.49	12.00 11.61
A 4788	No. 11—Independent High Grade Phosphate	Swartz Creek	{ G. F. }					17.80	0.34	16.00 17.46
A 4980	No. 11—Independent High Grade Phosphate	Ithaca						18.60	0.38	18.22 17.84
		Average						18.20	0.36	17.84 17.84

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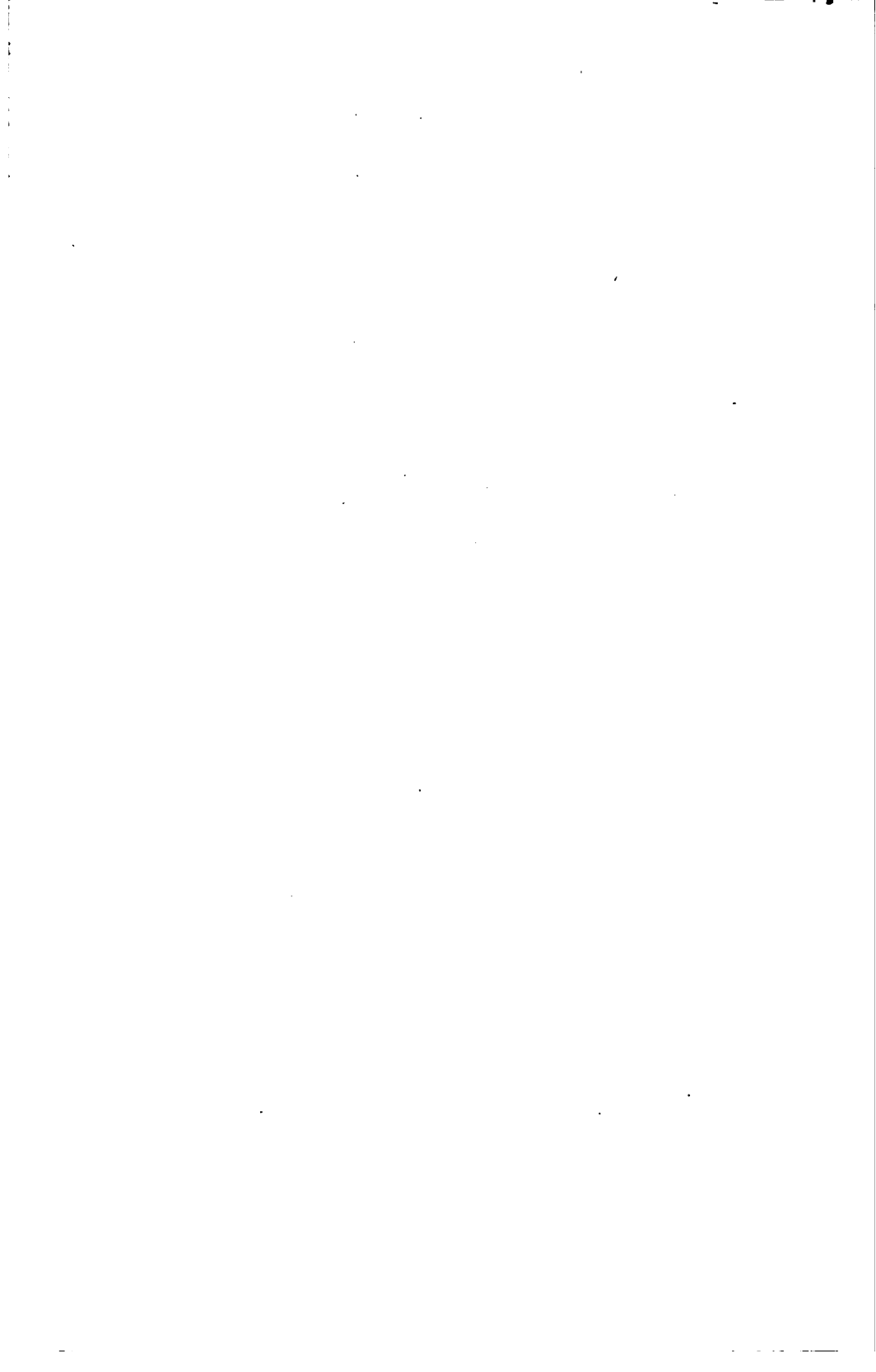
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 Kotila, J. E., B. S. Research Asst. in Botany
 Nelson, R., B. S. Research Asst. in Botany
 Young, H. C., M. S. Research Asst. in Botany
 Miller, E. J., M. S. Research Asst. in Chemistry
 Brownell, S. J., B. S. Research Asst. in Dairying

Riddell, F. T., B. S. Research Asst. in Dairying
 McDaniel, E. I., A. B. Research Asst. in Entomology
 Megee, C. R., M. S. Research Asst. in Farm Crops
 Putnam, G. W., B. S. Research Asst. in Farm Crops
 Partridge, N. L., Ph. D. Research Asst. in Horticulture
 Wheating, L. C., M. S. Research Asst. in Soils
 Grettenberger, M. L., B. S. Asst. in Chemistry
 O'Meara, Percy, B. S. Asst. in Chemistry
 Bandemer, S. L., B. S. Asst. in Chemistry
 Howland, A. J. Asst. in Dairying
 Kurtz, W. J., B. S. Asst. in Dairying
 Down, E. E., B. S. Asst. in Farm Crops
 Duncan, J. R. Asst. in Farm Crops
 Rainey, D. C., B. S. Asst. in Farm Crops
 Fogie, F. E., B. S. Asst. in Farm Mechanics
 Sauve, E. C., B. S. Asst. in Farm Mechanics
 Loree, R. E., B. S. Asst. in Horticulture
 Newlon, W. E., B. S. Asst. in Poultry Husbandry
 Simpson, C. W., B. S. Asst. in Soils
 Hebard, E., Inspector of Fertilizers and Feeds
 Teske, A. H. Inspector of Fertilizers and Feeds
 McMillan, D. L., B. S. Supt. Peninsula Exp. Station
 Hootman, H. D. Supt. Graham Horticultural Experiment Station
 Johnston, S. B. S. Supt. South Haven Horticultural Exp. Station
 Landon, L. E. Librarian
 Schepers, J. Cashier
 Campbell, N. W. Bookkeeper
 Bogue, M. V. Bulletin Clerk
 Christopher, B. H. Executive Clerk
 Schell, H. A. Clerk
 Beebe, B. Stenographer
 Rozema, M. Stenographer
 Helmic, Julia Stenographer
 Frost, Bessie Stenographer
 Meahan, Gertrude Stenographer

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
 South Haven, Van Buren County, 10 acres rented; 5 acres deeded.
 Graham Station, Kent County, 50 acres donated.





COMMERCIAL FEEDING STUFFS

ANDREW J. PATTEN, O. B. WINTER
M. L. GRETTEMBERGER and P. O'MEARA

AGRICULTURAL EXPERIMENT STATION
of the
MICHIGAN AGRICULTURAL COLLEGE

CHEMICAL SECTION

EAST LANSING, MICHIGAN



IMPORTANT NOTICE

During the last regular session of the legislature the bill (Act 13, P. A. 1921) creating the Department of Agriculture was passed. By the provisions of this bill the inspection of commercial feeding stuffs will, after July 1st, 1921, be conducted under the direction of the Department of Agriculture. All communications in regard to the licensing or inspection and analysis of commercial feeding stuffs should after the above mentioned date, be directed to the Commissioner of Agriculture, Lansing, Michigan.

COMMERCIAL FEEDING STUFFS

This bulletin contains the results of the inspection of commercial feeding stuffs during the period from September 1920 to June 1921. During this time 529 samples were collected and analyzed. This is, by far, the smallest number of samples that have ever been collected during a similar period, since the inspection has been carried on by the Chemical Section of the Michigan Agricultural Experiment Station under the supervision of the State Board of Agriculture. The unusual economic conditions that prevailed during the past nine months caused a tremendous falling off in the commercial feed business. The movement of mixed feeds, during the winter months especially, was extremely light. On the other hand, the sharp decline in the price of cottonseed meal, that occurred in the early winter stimulated its demand and the movement of this concentrate was greater than ever before. Furthermore, the quality of the cottonseed meal shipped into the State during the past winter was far superior to that of former years, the great bulk of the shipments being 43% protein meal.

The inspection of commercial feeding stuffs has been conducted by the chemical section of the Experiment Station since January 1916. The effect of this inspection upon the quality of the feeds sold in the State is clearly demonstrated in the following table, which shows the percentage of samples not equal to guarantee for both years.

Year ending July 1	1916	1921
Deficient in protein.....	15.0%	5.8%
Deficient in crude fat.....	11.5	2.8
Excess of crude fiber.....	9.9	2.4

More striking still is the comparison of the inspection results covering cottonseed meal for the same years as shown in the following table:

Year ending July 1	1916	1921
Deficient in protein.....	51.0%	4.7%
Deficient in crude fat.....	6.2	1.0
Excess of crude fiber.....	39.6	2.3

COOPERATION WITH U. S. DEPT. OF AGRICULTURE

Through a cooperative arrangement with U. S. Department of Agriculture, all interstate shipments of commercial feeding stuffs found to be below guarantee or that in any other respect have been shipped in violation of the provisions of the Federal Food and Drug act are referred to the U. S. Food and Drug Inspection Station, Central District, Chicago, Ill. During the past year sixteen samples have been disposed of in this way. In fifteen of the cases citations have been issued and the other case is still under investigation.

DEFINITIONS OF FEEDING STUFFS

It is important that farmers become familiar with the names and descriptions of commercial feeding stuffs, as these are used by feed manufacturers in listing the ingredients of mixed feeds. The definitions as amended and adopted by the Association of Feed Control Officials of the United States at its last meeting are as follows:

Meal is the clean, sound, ground product of the entire grain, cereal or seed which it purports to represent.

Chop is a ground or chopped feed composed of one or more different cereals or by-products thereof. If it bears a name descriptive of the kind of cereals, it must be made exclusively of the entire grains of those cereals.

Alfalfa meal is the entire alfalfa hay ground, and does not contain an admixture of ground alfalfa straw or other foreign materials.

ANIMAL PRODUCTS

Blood Meal is ground dried blood.

Cracklings are the residue after partially extracting the fats and oils from the animal tissues. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

Digester Tankage is the residue from animal tissues, exclusive of hoof and horn, specially prepared for feeding purposes by tanking under live steam, drying under high heat, and suitable grinding. If it contains more than 10 per cent of phosphoric acid (P_2O_5) it must be designated **Digester Meat and Bone Tankage**.

Meat Scrap and Meat Meal are the ground residues from animal tissues exclusive of hoof and horn. If they contain more than 10 per cent of phosphoric acid (P_2O_5) they must be designated **Meat and Bone Scrap and Meat and Bone Meal**. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

BARLEY PRODUCTS

Barley Hulls are the outer chaffy coverings of the barley grain.

Barley Feed is the entire by-product resulting from the manufacture of pearl barley from clean barley.

Barley Mixed Feed is the entire offal from the milling of barley flour from clean barley and is composed of barley hulls and barley middlings.

BREWERS' AND DISTILLERS' PRODUCTS

Brewers' Dried Grains are the properly dried residue from cereals obtained in the manufacture of beer.

Distillers' Dried Grains are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

Distillers' Corn Solubles, a by-product from the manufacture of alcohol from corn, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Distillers' Corn and Rye Solubles, a by-product from the manufacture of alcohol from corn and rye, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Distillers' Rye Solubles, a by-product from the manufacture of alcohol from rye, is a mash liquor concentrated after the removal of the alcohol and wet grains.

Malt Sprouts are the sprouts of the barley grain. If the sprouts are derived in any other malted cereal, the source must be designated.

BUCKWHEAT PRODUCTS

Buckwheat Shorts or Buckwheat Middlings are that portion of the buckwheat immediately inside of the hull after separation from the flour.

CORN PRODUCTS

Corn Bran is the outer coating of the corn kernel.

Corn Feed Meal is the by-product obtained in the manufacture of cracked corn, with or without aspiration products added to the siftings, and is also a by-product obtained in the manufacture of table meal from the whole grain in the non-degerminating process.

Corn Germ Meal is a product in the manufacture of starch, glucose and other corn products, and is the germ layer from which part of the corn oil has been extracted.

Grits are the hard, flinty portions of Indian corn, without hulls and germs.

Corn Gluten Meal is that part of commercial shelled corn that remains after separation of the larger part of the starch, the germ and the bran, by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Corn Gluten Feed is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germs by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

Hominy Feed, Hominy Meal or Hominy Chop is the kiln dried mixture of mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the white corn kernel obtained in the manufacture of hominy, hominy grits and corn meal by the degerminating process.

Yellow Hominy Feed, Yellow Hominy Meal or Yellow Hominy Chop is a kiln dried mixture of the mill run bran coating, the mill run germ, with or without a partial extraction of the oil and a part of the starchy portion of the yellow corn kernel obtained in the manufacture of yellow hominy grits and yellow corn meal by the degerminating process.

OIL CAKE

Oil Cake is the residual cake obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product, the name of the seed from which it is obtained shall be prefixed to "oil cake."

Ground Oil Cake is the product obtained by grinding oil cake. When used alone, the term "ground oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "ground oil cake."

COTTONSEED PRODUCTS

Cottonseed Meal is a product of the cottonseed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 38 per cent of protein.

Choice Cottonseed Meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint, and must contain at least 41 per cent of protein.

Prime Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent of protein.

Good Cottonseed Meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

Cottonseed Feed is a mixture of cottonseed meal and cottonseed hulls, containing less than 36 per cent of protein.

Cold Pressed Cottonseed is the product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire cottonseed less the oil extracted.

Ground Cold Pressed Cottonseed is the ground product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire ground cottonseed less the oil extracted.

LINSEED AND FLAX PRODUCTS

Linseed Meal is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes, provided that the final product shall not contain over six per cent of weed seeds and other foreign materials and provided further that no portion of the stated six per cent. of weed seeds and other foreign materials shall be deliberately added.

Oil Meal is the ground product obtained after the extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from seeds which have been screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Oil Meal" shall be understood to designate linseed meal as defined. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to the words "oil meal."

Old Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "Old Process Oil Meal" shall be understood to designate linseed meal as defined, made by the old process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "old process oil meal."

New Process Oil Meal is the ground product obtained after extraction of part of the oil by crushing, heating and the use of solvents from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "New Process Oil Meal" shall be

understood to designate linseed meal as defined, made by the new process. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "new process oil meal."

Flax Plant By-Product is that portion of the flax plant remaining after the separation of the seed, the bast fiber and a portion of the shives, and consists of flax shives, flax pods, broken and immature flax seeds, and the cortical tissues of the stem.

Ground-Flaxseed or Flaxseed Meal is the product obtained by grinding flaxseed which has been screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes, provided that the final product shall not contain over four per cent of weed seeds and other foreign materials, and provided further that no portion of the stated four per cent of weed seeds and other foreign materials shall be deliberately added.

Unscreened Flaxseed Oil Feed is the ground product obtained after extraction of part of the oil from unscreened flaxseed by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents. When sold without grinding the unground product shall be designated as "unscreened flaxseed oil feed cake."

Ingredients of Unscreened Flaxseed Oil Feed—Ground cake from partially extracted flaxseed and foreign seeds (wheat, wild buckwheat, pigeon grass, wild mustard, etc.)

Screenings Oil Feed is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from the smaller imperfect grains, weed seeds and other foreign materials, having feeding value, separated in cleaning the grain. The name of the grain from which the screenings are separated shall be prefixed to "screenings oil feed."

OAT PRODUCTS

Oat Groats are the kernels of the oat berry.

Oat Hulls are the outer chaffy coverings of the oat grain.

Oat Middlings are the floury portions of the oat groat obtained in the milling of rolled oats.

Oat Shorts are the covering of the oat grain lying immediately inside the hull, being a fuzzy material carrying with it considerable portions of the fine floury part of the groat obtained in the milling of rolled oats.

Clipped Oat By-Product is the resultant by-product obtained in the manufacture of clipped oats. It may contain light chaffy material broken from the ends of the hulls, empty hulls, light, immature oats and dust. It must not contain an excessive amount of oat hulls.

PEANUT PRODUCTS

Peanut Oil Cake is the residue after the extraction of part of the oil by pressure or solvents from peanut kernels.

Peanut Oil Meal is the ground residue after the extraction of part of the oil from peanut kernels.

Unhulled Peanut Oil Feed is the ground residue obtained after extraction of part of the oil from whole peanuts and the ingredients shall be designated as **Peanut Meal and Hulls**.

RICE PRODUCTS

Rice Bran is the cuticle beneath the hull.

Rice Hulls are the outer chaffy coverings of the rice grain.

Rice Polish is the finely powdered material obtained in polishing the kernel.

RYE PRODUCTS

Rye Middlings or Rye Feed consists of the products other than the flour obtained in the manufacture of the ordinary or "100%" rye flour from the rye grain which has been cleaned and scoured.

Rye Red Dog Flour consists of a mixture of low-grade flour, fine particles of bran and the fibrous offal from the "tail of the mill."

VELVET BEAN PRODUCTS

Velvet Bean Meal is ground velvet beans containing only an unavoidable trace of hulls or pods.

Ground Velvet Bean and Pod is the product derived by grinding velvet beans "in the pod." It contains no additional pods or other materials.

WHEAT PRODUCTS

Wheat Bran is the coarse outer coating of the wheat kernel as separated from cleaned and scoured wheat in the usual process of commercial milling.

Standard Middlings (Red Shorts or Brown Shorts) consists mostly of the fine particles of bran, germ and very little of the fibrous offal obtained from the "tail of the mill." This product must be obtained in the usual commercial process of milling.

Gray Shorts (Gray Middlings or Total Shorts) consists of the fine particles of the outer bran, the inner or "bee-wing" bran, the germ, and the offal or fibrous material obtained from the "tail of the mill." This product must be obtained in the usual process of commercial milling.

Flour Middlings shall consist of standard middlings and red dog flour combined in the proportions obtained in the usual process of milling.

White Shorts or White Middlings consists of a small portion of the fine bran particles and the germ and a large portion of the fibrous offal obtained from the "tail of the mill." This product must be obtained in the usual process of flour milling.

Red Dog Flour consists of a mixture of low-grade flour, fine particles of bran and the fibrous offal from the "tail of the mill."

Wheat Mixed Feed (Mill Run Wheat Feed) consists of pure wheat bran and the gray or total shorts or flour middlings combined in the proportions obtained in the usual process of commercial milling.

Wheat Bran and Standard Middlings consists of the two commodities as defined above mixed in the proportions obtained in the usual process of commercial milling.

Screenings consists of the smaller imperfect grains, weed seeds and other foreign materials, having feeding value, separated in cleaning the grain.

Scourings consists of such portions of the cuticle, brush, white caps, and

smut, and other materials as are separated from the grain in the usual commercial process of scouring.

(Note) If to any of the wheat or rye by-product feeds there should be added screenings or scourings, as above defined, either ground or unground, bolted or unbolted, such brand shall be so registered, labeled and sold as clearly to indicate this fact. The word "Screenings" or "Scourings" as the case may be, shall appear as a part of the name or brand and shall be printed in the same size and face of type as the remainder of the brand name. When the word "Screenings" appears it is not necessary to show also on the labeling the word "Scourings."

MISCELLANEOUS PRODUCTS

Dried Beet Pulp is the material obtained by drying the residue from sugar beets which have been cleaned and freed from crowns, leaves and sand and which have been extracted in the process of manufacturing sugar.

Cocoanut Oil Meal ("Copra Oil Meal") is the ground residue from the extraction of part of the oil from the dried meat of the cocoanut.

Ivory Nut Meal is ground ivory nuts.

Palm Kernel Oil Meal is the ground residue from the extraction of part of the oil by pressure or solvents from the kernel of the fruit of *Elaeis guineensis* or *Elaeis malanococoa*.

Yeast or Vinegar Dried Grains are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar, and consists of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugars, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast.

TENTATIVE DEFINITIONS

41.12 Per Cent Protein Cottonseed Meal, Choice Quality, must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint, and by analysis must contain at least 41.12 per cent crude protein equivalent to 8 per cent of ammonia.

Cottonseed Meal not fulfilling the above requirements as to color, odor or texture, shall be branded Off Quality.

38.56 Per Cent Protein Cottonseed Meal, Prime Quality, must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and by analysis must contain at least 38.56 per cent crude protein, equivalent to 7½ per cent of ammonia.

Cottonseed Meal not fulfilling the above requirements as to color, odor or texture, shall be branded Off Quality.

36 Per Cent Protein Cottonseed Meal, Good Quality, must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and by analysis must contain at least 36 per cent crude protein, equivalent to 7 per cent of ammonia.

Cottonseed Meal not fulfilling the above requirements as to color, odor or texture, shall be branded Off Quality.

Fish Meal shall be the dried, ground tissues of fish made from undecomposed fish, with or without the extraction of part of the oil.

Fish Residue Meal shall be the clean undecomposed residue from the manufacture of glue or other fishery products and to be from non-oily fish.

Maltose Process Corn Gluten Feed is the dried residue from degermed corn, after removal of starch in the manufacture of malt syrup.

Ground Barley is the entire product obtained by grinding clean sound barley, containing not less than 90 per cent pure barley and not more than 10 per cent of other grains, weed seeds and other foreign material and not more than 6 per cent fiber. Provided that no portion of this stated 10 per cent of other grains, weed seeds or foreign material shall be deliberately added.

Mixed Feed Barley is the entire product obtained by grinding country run barley containing not less than 75 per cent pure barley and not more than 25 per cent other grains, weed seeds and other foreign material. Provided that no portion of this stated 25 per cent of other grains, weed seeds or foreign material shall be deliberately added. The ingredients must be stated as barley, other grains, weed seeds and other foreign material.

Rice Bran is the pericarp or bran layer of the rice grain, with only such quantity of hull fragments as is unavoidable in the regular milling of rice.

Chopped Alfalfa is the entire alfalfa hay, chopped and not ground finely enough to become a meal. It must not contain an admixture of alfalfa straw or other foreign material.

Ear Corn Chops is corn and cob, chopped, without the husk, with not a greater proportion of cob than occurs in the ear corn in its natural state.

Head Chops consists of the entire head of the grain sorghums, chopped, and should bear the name of the sorghum from which it is made. This includes, among others, kafir head chops, milo head chops, feterita head chops, and sorghum head chops.

Head Stems consists of the head of the grain sorghums, from which the grain has been removed, and should bear the name of the sorghum from which it is made.

RESOLUTIONS ADOPTED

Resolved that it is the sense of this Association that we understand the term "Nitrogen Free Extract" to cover the product indicated by the percentage obtained by subtracting from 100 per cent the sum of the percentages of Ash, Moisture, Protein, Fat and Fiber.

Resolved that the term "Carbohydrates" be interpreted to cover the product indicated by the percentage obtained by the addition of the percentages of crude fiber and nitrogen free extract.

Resolved that this Association goes on record as condemning the practice of the packing of cottonseed meal and other feeds in bags containing 99 lbs. net, and billing and charging for the same 100 lbs. net.

Resolved that it is the sense of this Association that a ton of feed be 2,000 pounds, net.

PROPOSED STANDARDS FOR WHEAT MILL FEEDS

	Protein (Min)	Fat (Min)	Fiber (Max)
Standard Middlings	16.0 per cent	4.5 per cent	9.0 per cent
Flour Middlings	15.0 per cent	3.0 per cent	6.0 per cent
Red Dog Flour	16.0 per cent	4.5 per cent	4.0 per cent
Brown Shorts	15.5 per cent	3.5 per cent	6.5 per cent
Gray Shorts	16.0 per cent	3.5 per cent	5.5 per cent
White Shorts	14.5 per cent	3.0 per cent	3.5 per cent
Wheat Mixed Feed	15.5 per cent	3.5 per cent	8.5 per cent

STOCK AND POULTRY "CONDITIONERS"

During the past year we have examined a number of so-called stock and poultry conditioners or tonics. While these do not come under the jurisdiction of the feeding stuffs law it was felt that the matter was of sufficient importance to examine, more or less thoroughly, all samples coming to our attention. Most of the samples were sent to the laboratory by residents of the State and a few were collected by the inspectors. In most of the cases the ingredients have simply been identified with no attempt made to estimate the quantity of each. In those samples that consist largely of mineral salts a fairly complete analysis has been made.

From an examination of the ingredients found in these various preparations it will be possible for a person to form a very good estimate of their value, especially, if it is remembered that such materials as cocoa shells, peanut shells and buckwheat hulls have very little feeding value, and, so far as is known, no medicinal or tonic value. In many cases these materials constitute the major part of the preparation.

A list of the preparations examined and the results obtained is given below—

"SAL-TONIK"

Manufactured by the Guarantee Veterinary Co., Chicago, Ill., and Sioux City, Ia. This preparation is marketed in the form of blocks weighing 50 lbs. each. The analysis of a sample submitted by Henry Ver Hulst, Hamilton, Michigan follows:—

Sodium Chloride (Salt)	94.20%
Sodium Sulfate (Glauber's Salt)	1.89%
Sodium Bicarbonate	0.30%
Magnesium Sulfate (Epsom Salt)	1.20%
Calcium carbonate	0.84%
Organic Matter	0.34%
Insoluble Mineral Matter	1.19%

The insoluble matter contained free sulfur and oxide of iron which was not determined.

A second sample submitted by O. M. Wallace, Burton, Mich., contained 96.65 per cent salt.

"DOZ-IT"

Manufactured by the Farmers' Medicated Stock Salt Co., Mifflinburg, Pa. Sample submitted by Anthony Fenis, Westphalia, Mich.

Sodium Chloride (Salt)	94.25%
Charcoal	3.58%
Traces of Magnesium Sulfate (Epsom Salt) and Ferrous Sulfate (Copperas).	

A second sample submitted by the Gladstone Grocery, Gladstone, Mich. gave the following analysis:

Sodium Chloride (Salt)	94.95%
Charcoal	2.87%

"FEDERAL STOCK CONDITIONER"

Manufactured by the Federal Stock Food Co., Mifflinburg, Pa. Sample submitted by D. L. Hagerman, Grand Rapids, Mich.

The following ingredients were identified: Cocoa shell meal, buckwheat hulls, peanut shells, oyster shells, salt, calcium carbonate and traces of copperas, mustard and red pepper.

"EMPIRE STOCK CONDITIONER"

Manufactured by the Capitol Food Co., New York City. Sample submitted by John C. Liken Co., Sebawaing, Mich.

The following materials have been identified: Cocoa shells, peanut shells and meal, buckwheat hulls, oyster shells, sulfur, ferrous sulfate (copperas) and traces of magnesium sulfate (Epsom Salt), gentian, sassafras, anise, capsicum and mica.

"EMPIRE POULTRY CONDITIONER"

Manufactured by the Capitol Food Co., New York City. Sample submitted by John C. Liken Co., Sebawaing, Mich. The following materials were identified: Cocoa shells, peanut shells, buckwheat hulls, oyster shells (25%), sulfur, charcoal, copperas and traces of mustard, sassafras bark, fenugreek, anise, black pepper, mica.

"MOORMAN'S MINERAL MIXTURE"

Manufactured by Moorman Manufacturing Co., Quincy, Ill. Sample submitted by Otto B. Schulze, Nashville, Mich.

The following materials were identified: Sodium sulfate (Glauber's

salt), rock phosphate, sulfur, charcoal and trace of copperas. The ingredients are present in about the following proportions:

Glauber's Salt	45.70%
Rock phosphate	24.02%
Sulfur	7.15%
Charcoal and sand	23.13%
Copperas	trace

"DR. HESS' STOCK TONIC"

Manufactured by Drs. Hess & Clark, Ashland, Ohio. Sample submitted by Inspector Teske. The following ingredients were identified: Salt (42.43%), epsom salt, glauher's salt, potassium nitrate (salt peter) copperas, quassia, fenurgreek, nux vomica, wheat bran, charcoal.

"GUARDIAN STOCK CONDITIONER"

Manufactured by the Guardian Food Company, New York City and Indianapolis, Ind. Sample submitted by C. M. Kidman, Port Huron, Mich.

Ingredients identified: Peanut shells, charcoal, fenurgreek, quassia, salt, copperas, Glauber's salt, sulfur.

The ingredients are present in approximately the following proportions:

Sodium chloride (salt)	66.47%
Sulfur	0.71%
Sodium Sulfate (Glauber's Salt)	
Ferrous Sulfate (Copperas)	
	10.17%
Charcoal	
Peanut Shells	
	22.65%
	10.17%
	22.65%

ANALYSES OF FEEDING STUFFS FOR 1920-1921

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
COTTONSEED MEAL							
American Cotton Oil Co., New York City							
B 6218	Surety Brand Cottonseed Meal	Grand Rapids	8.0	37.4	5.5	14.0	\$45.00
B 6219	Surety Brand Cottonseed Meal	Grand Rapids	8.0	37.4	7.0	10.5	45.00
B 6224	Surety Brand Cottonseed Meal	Grand Rapids	8.0	36.8	7.6	12.7	46.00
B 6303	Surety Brand Cottonseed Meal	Howell	8.4	39.6	9.3	8.2	2.30
	Average		8.6	37.0	8.0	10.7	
American Milling Co., Peoria, Ill.							
B 6183	AMCO Cottonseed Meal	Nunica	9.2	41.0	9.0	12.0	58.00
B 6237	AMCO Cottonseed Meal	Zeeland	8.8	40.4	7.7	11.9	40.00
	Average		9.0	41.1	7.2	10.4	
The J. E. Bartlett Co., Jackson, Mich.							
B 5934	Farmer Brand Cottonseed Meal	Washington	9.0	41.0	5.0	14.0	
B 5937	Farmer Brand Cottonseed Meal	Ann Arbor	8.5	42.4	7.6	9.4	
	Average		8.8	43.1	7.9	10.0	
B 5909	Farmer Brand Choice Cottonseed Meal	Carleton	8.6	42.8	7.8	9.7	
B 5910	Farmer Brand Choice Cottonseed Meal	Manchester	8.6	45.0	7.0	10.0	68.00
B 5927	Farmer Brand Choice Cottonseed Meal	Fowlerville	8.3	42.5	7.8	12.4	
B 5942	Farmer Brand Choice Cottonseed Meal	Rochester	8.3	44.5	6.8	10.9	
B 5949	Farmer Brand Choice Cottonseed Meal	Kosheo	8.9	44.6	7.2	9.8	6.00
B 5950	Farmer Brand Choice Cottonseed Meal	Kosheo	8.9	42.4	9.2	7.1	68.00
B 5953	Farmer Brand Choice Cottonseed Meal	Kosheo	7.5	45.0	7.7	10.9	68.00
B 5958	Farmer Brand Choice Cottonseed Meal	Pinkney	6.8	45.7	7.2	7.6	63.00
B 5968	Farmer Brand Choice Cottonseed Meal	Linden	8.9	42.0	7.4	11.1	3.50
B 5987	Farmer Brand Choice Cottonseed Meal	Saginaw	7.9	46.0	11.6	7.1	
B 5988	Farmer Brand Choice Cottonseed Meal	Birch Run	7.9	46.2	7.3	7.1	50.00
B 5991	Farmer Brand Choice Cottonseed Meal	Cass City	8.4	46.8	7.2	8.0	60.00
B 6021	Farmer Brand Choice Cottonseed Meal	Bay City	12.3	46.3	8.2	4.7	58.00

FEEDING STUFFS

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B 6003	Farmer Brand Choice Cottonseed Meal.....	Mt. Clemens.....	8.3	45.6	7.8	8.8	60.00
B 6007	Farmer Brand Choice Cottonseed Meal.....	St. Johns.....	7.9	44.5	6.2	8.5	55.00
B 6241	Farmer Brand Choice Cottonseed Meal.....	Zeeland.....	8.1	42.5	8.0	10.5	2.50
B 6413	Farmer Brand Choice Cottonseed Meal.....	Union City.....	8.0	44.3	8.7	7.6	
	Average.....		8.3	44.2	7.7	8.7	
B 6242	Farmer Brand Prime Cottonseed Meal.....	Zeeland.....	{ G.†	38.8	5.0	18.0	40.00
			{ F.†	40.6	7.9	11.7	
B 5973	Farmer Brand "Straight" Cottonseed Meal.....	Milford.....	{ G.†	36.0	5.0	17.0	5.50
			{ F.†	37.0	7.0	10.5	
B 6403	Holstein Brand Cottonseed Meal.....	Croswell.....	{ G.†	36.0	6.0	12.0	
			{ F.†	39.8	7.3	8.1	
B 6127	Jay Brand Cottonseed Meal.....	Grand Rapids.....	{ G.†	36.0	5.0	14.0	
			{ F.†	39.0	9.6	10.2	
B 5952	Ordinary Cottonseed Meal.....	Thomas.....	{ G.†	45.0	6.0	9.0	70.00
			{ F.†	40.0	6.5	12.7	
B 5917	"Buckeye" Good Cottonseed Meal.....	Lansing.....	{ G.†	36.0	6.0	14.0	
B 5992	"Buckeye" Good Cottonseed Meal.....	Uly.....	{ P.†	36.9	7.5	9.9	62.00
B 6030	"Buckeye" Good Cottonseed Meal.....	Bay City.....	10.4	35.0	6.3	14.6	55.00
B 6043	"Buckeye" Good Cottonseed Meal.....	Parma.....	7.6	35.9	8.4	11.1	
			8.2	35.7	6.8	12.2	
	Average.....		8.5	35.9	7.3	12.0	
B 5941	Besteed Cottonseed Meal & Cake.....	Walled Lake.....	{ G.†	43.0	5.0	12.0	
B 6003	Besteed Cottonseed Meal & Cake.....	Albion.....	{ P.†	44.9	7.4	8.9	59.00
B 6017	Besteed Cottonseed Meal & Cake.....	Saline.....	9.2	46.2	7.8	8.1	55.00
B 6139	Besteed Cottonseed Meal & Cake.....	Decatur.....	8.7	45.1	9.3	6.8	
B 6204	Besteed Cottonseed Meal & Cake.....	Trufant.....	8.1	48.5	7.1	7.1	
B 6208	Besteed Cottonseed Meal & Cake.....	Kalamazoo.....	7.4	46.0	9.3	6.6	58.00
			6.3	51.3	8.9	4.8	48.00
	Average.....		8.0	47.2	8.3	7.1	

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
COTTONSEED MEAL.—Cont.							
B 6096	Beauty Cottonseed Meal.	{ G+ (F+)	8.3	36.0	6.0	14.0	\$46.00
B 6386	Beauty Cottonseed Meal.	{ G+ (F+)	7.9	35.9	7.2	11.6	
	Average.		8.1	38.2	7.4	9.6	
B 5960	Goodluck Cottonseed Meal.	{ G+ (F+)	7.1	41.0	0.0	10.0	60.00
	Milan.	{ G+ (F+)	7.1	41.6	8.8	7.1	
	Average.		7.1	41.3	4.4	8.6	
B 5959	Steerboy Cottonseed Meal.	{ G+ (F+)	7.8	45.0	6.0	10.0	67.00
B 5961	Steerboy Cottonseed Meal.	{ G+ (F+)	7.0	42.8	8.6	9.7	
	Average.		7.4	46.6	7.4	7.5	
East St. Louis Cotton Oil Co., Chicago, Ill.							
B 6105	Illinois Brand Cottonseed Meal.	{ G+ (F+)	6.7	41.0	6.0	12.0	43.00
B 6414	Illinois Brand Cottonseed Meal.	{ G+ (F+)	7.6	44.1	7.9	6.3	
	Average.		7.2	41.8	8.1	7.1	
B 5905	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	8.8	36.0	5.0	16.0	70.00
B 5906	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	8.6	37.3	6.7	13.2	
B 5925	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	8.6	36.3	8.0	11.4	
B 5944	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	8.9	36.8	6.5	14.0	63.00
B 6041	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	8.9	36.4	6.8	15.7	
B 6045	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.7	36.0	6.6	13.8	
B 8074	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.1	38.2	7.6	11.8	50.00
B 8075	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.0	38.4	7.9	12.3	
B 8091	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.8	37.4	6.7	7.6	
B 8220	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.3	36.1	6.0	13.9	50.00
B 8236	St. Clair Brand Cottonseed Meal.	{ G+ (F+)	9.3	36.4	6.0	12.4	

B 6247	St. Clair Brand Cottonseed Meal.....	Muskegon.....	7.9	36.1	7.3	11.6	40.00
	Average.....	Average.....	9.1	37.1	7.0	12.6	
B 5955	Fidelity Cottonseed Meal.....	Ann Arbor.....	.....	45.0	6.0	12.0	58.00
B 5956	Fidelity Cottonseed Meal.....	Ypsilanti.....	7.6	44.9	7.1	8.8	58.00
B 5957	Fidelity Cottonseed Meal.....	Ypsilanti.....	7.0	44.5	8.4	9.2	58.00
B 5958	Fidelity Cottonseed Meal.....	Willis.....	6.9	46.4	7.4	7.5	58.00
B 5962	Fidelity Cottonseed Meal.....	Ida.....	6.1	45.4	8.7	7.6	57.50
B 5967	Fidelity Cottonseed Meal.....	Orosco.....	7.6	45.4	7.2	8.0	56.00
B 5971	Fidelity Cottonseed Meal.....	Holly.....	7.5	42.3	6.8	9.9	60.00
B 5977	Fidelity Cottonseed Meal.....	Monroe.....	8.5	44.5	8.0	7.1	57.00
B 5978	Fidelity Cottonseed Meal.....	Ida.....	7.9	45.8	7.2	7.8	60.00
B 5979	Fidelity Cottonseed Meal.....	Milan.....	7.3	44.7	8.1	8.2	56.00
B 5980	Fidelity Cottonseed Meal.....	St. Clair.....	8.8	40.6	13.3	7.8	57.00
B 5982	Fidelity Cottonseed Meal.....	Azala.....	7.0	43.7	7.3	8.4	56.00
B 5983	Fidelity Cottonseed Meal.....	Milan.....	8.4	45.6	6.6	7.2	60.00
B 5984	Fidelity Cottonseed Meal.....	Onsted.....	7.6	46.4	7.5	7.7	58.00
B 5990	Fidelity Cottonseed Meal.....	Elington.....	7.5	47.7	8.2	7.0	.....
B 5996	Fidelity Cottonseed Meal.....	So. Rockwood.....	8.2	43.6	7.7	8.0	.....
B 6002	Fidelity Cottonseed Meal.....	Pittsford.....	9.0	40.7	12.7	10.9	56.00
B 6059	Fidelity Cottonseed Meal.....	St. Clair.....	6.9	45.4	8.3	7.4	60.00
B 6152	Fidelity Cottonseed Meal.....	Marcellus.....	6.9	45.6	7.1	8.5	.....
B 6154	Fidelity Cottonseed Meal.....	Cassopolis.....	9.3	46.4	7.0	6.3	.....
B 6163	Fidelity Cottonseed Meal.....	Conklin.....	8.1	46.3	7.5	6.6	60.00
B 6202	Fidelity Cottonseed Meal.....	Grand Lodge.....	6.7	44.4	8.7	9.5	.....
B 6145	Fidelity Cottonseed Meal.....	Ambie.....	6.5	44.1	10.2	8.7	.....
B 6146	Fidelity Cottonseed Meal.....	Ambie.....	.....	.....	.....	.....	.....
	Average.....	Average.....	7.6	44.9	8.2	8.1	
B 5902	Texas Brand Cottonseed Meal 43%.....	Caro.....	.....	45.0	6.0	12.0	69.00
B 5904	Texas Brand Cottonseed Meal 43%.....	Fairgrove.....	9.0	44.0	6.6	9.2	69.00
B 6035	Texas Brand Cottonseed Meal 43%.....	Akron.....	8.8	43.3	6.5	9.1	55.00
B 6105	Texas Brand Cottonseed Meal 43%.....	Augusta.....	7.9	44.4	8.0	9.1	75.00
B 6382	Texas Brand Cottonseed Meal 43%.....	Morenci.....	8.5	46.8	7.9	7.3	42.00
	Average.....	Average.....	8.2	44.7	7.3	8.5	
B 6176	Cottonseed Meal.....	Grand Rapids.....	.....	56.0	6.0	14.0	50.00
	Average.....	Average.....	9.0	45.3	7.5	9.1	

†Abbreviations for Guaranteed and Found.

MICHIGAN AGRICULTURAL EXPERIMENT STATION

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture %	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
COTTONSEED MEAL.—Cont.							
Hayes Grain & Commission Co., Chicago, Ill.							
B 5901	Arkansaw Brand Cottonseed Feed	Grass Lake	8.8	36.0	6.0	14.0	\$65.50
B 5904	Arkansaw Brand Cottonseed Feed	Pinckney	7.8	40.2	8.2	11.0	
B 5965	Arkansaw Brand Cottonseed Feed	Quincy	6.4	34.3	8.4	13.1	60.00
B 5975	Arkansaw Brand Cottonseed Feed	Milford	8.0	35.3	8.3	12.0	2.50
B 5989	Arkansaw Brand Cottonseed Feed	Vassar	8.8	35.7	8.0	13.5	
B 5994	Arkansaw Brand Cottonseed Feed	Bad Axe	8.8	37.9	8.1	10.8	
B 6005	Arkansaw Brand Cottonseed Feed	Parma	8.5	35.6	6.5	12.0	
B 6028	Arkansaw Brand Cottonseed Feed	Bay City	7.5	40.0	7.3	8.3	50.00
B 6070	Arkansaw Brand Cottonseed Feed	Mason	7.8	37.0	6.5	13.0	
B 6118	Arkansaw Brand Cottonseed Feed	Allegan	7.7	36.7	6.8	10.6	40.00
B 6180	Arkansaw Brand Cottonseed Feed	Hudsonville	9.0	41.5	8.2	14.0	72.00
B 6253	Arkansaw Brand Cottonseed Feed	Hudsonville	8.2	38.9	6.9	7.2	60.00
B 6272	Arkansaw Brand Cottonseed Feed	Big Rapids	8.6	38.5	7.5	8.6	55.00
B 6399	Arkansaw Brand Cottonseed Feed	Harbor Beach	8.1	35.8	9.0	9.1	53.00
	Average		8.1	37.4	7.4	11.1	
B 6019	Hayes Brand, Cottonseed Meal & Cake	Salzburg	7.6	45.0	6.5	9.5	2.75
B 6064	Hayes Brand, Cottonseed Meal & Cake	Pontiac	6.9	45.8	8.0	4.2	50.00
	Average		7.3	46.9	10.0	5.1	
B 5918	Supreme Brand Cottonseed Meal	Lansing	7.5	38.6	6.0	12.0	
			7.5	40.7	7.8	12.3	
B 6408	Bull Brand Cottonseed Meal	Brown City	7.8	45.0	5.0	10.0	
			7.8	43.9	8.1	7.7	
B 6098	Imperial Cotto Brand Choice Cottonseed Meal	Wayne	8.2	41.0	6.0	8.0	47.00
B 6151	Imperial Cotto Brand Choice Cottonseed Meal	Three Rivers	7.7	41.6	8.0	7.2	
	Average		8.0	41.8	8.3	8.3	
			8.0	41.7	8.2	7.8	

B 6060	Silo Brand Cottonseed Meal or Cake.....	Ann Arbor.....	{G.† P.†}	7.6	45.0 46.9	5.0 7.5	16.0 6.7	47.00
Industrial Cotton Oil Properties, New York City								
B 5989	Longhorn Brand Prime Cottonseed Meal.....	Penton.....	{G.† P.†}	7.0	43.0 43.0	6.0 7.2	12.0 7.4	.....
B 5976	Longhorn Brand Prime Cottonseed Meal.....	Trenton.....	{G.† P.†}	7.9	43.3	7.7	10.2	.....
	Average.....	Average.....		7.5	43.2	8.0	8.8	
B 6524	Ordinary Cottonseed Meal.....	Plainwell.....	{G.† P.†}	8.4	43.0 44.6	6.0 10.0	12.0 5.6	44.00
Larowe Milling Company, Detroit, Mich.								
B 5985	Larowe Brand Choice Cottonseed Meal.....	Okemos.....	{G.† P.†}	8.2	43.0 43.7	6.0 8.2	10.0 9.9	3.50
B 6409	Larowe Brand Choice Cottonseed Meal.....	Lapeer.....	{G.† P.†}	8.8	44.8	7.6	8.0	.....
	Average.....	Average.....		8.5	44.3	7.9	9.0	
B 6375	"Neal's Choice" Cottonseed Meal.....	Coldwater.....	{G.† P.†}	8.2	43.0 46.3	6.0 8.2	10.0 7.5	.....
B 5938	Thirty-Six Brand Cottonseed Meal.....	Mason.....	{G.† P.†}	7.6	36.0 35.0	5.0 6.7	14.0 13.1	55.00
B 5946	Thirty-Six Brand Cottonseed Meal.....	New Haven.....	{G.† P.†}	7.5	39.2	8.5	8.4	70.00
B 6066	Thirty-Six Brand Cottonseed Meal.....	Leslie.....	{G.† P.†}	8.0	36.7	7.4	11.5	2.25
B 6243	Thirty-Six Brand Cottonseed Meal.....	Zeeland.....	{G.† P.†}	8.5	36.7	6.8	10.3	40.00
	Average.....	Average.....		7.9	36.9	7.4	10.8	
B 6525	Star Brand Cottonseed Meal.....	Plainwell.....	{G.† P.†}	10.0	36.0 37.3	6.0 6.3	14.0 12.6	40.00
B 6275	Bee Brand Cottonseed Meal.....	Grand Rapids.....	{G.† P.†}	8.2	41.0 42.6	6.0 8.7	12.0 4.9	44.00
B 5903	Queen Bee Brand Cottonseed Meal.....	Caro.....	{G.† P.†}	7.4	44.9	6.6	10.0	70.00
B 5986	Queen Bee Brand Cottonseed Meal.....	Lansing.....	{G.† P.†}	6.5	43.9	8.7	7.3	.....
B 6197	Queen Bee Brand Cottonseed Meal.....	Brunswick.....	{G.† P.†}	7.4	43.1	7.7	5.3	55.00
	Average.....	Average.....		7.1	43.9	7.7	7.5	
B 6213	Standard Brand Cottonseed Meal.....	Zeeland.....	{G.† P.†}	8.8	36.0 36.7	5.0 6.7	12.0 13.6	50.00

†Abbreviations for Guaranteed and Pounds.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
COTTONSEED MEAL.—Cont.							
Ryan Cotton Oil Co., Ryan, Okla.							
B 6138	Prime Cottonseed Meal and Cake	{ G† P†	7.8	43.0 43.4	6.0 8.4	10.0 10.5	.....
J. M. Sansom & Co., Dallas, Texas							
B 5966	Sansom's 36 Cottonseed Meal	{ G† P†	7.2	39.0 35.2	6.0 8.3	19.0 12.3	\$55.00
Southland Cotton Oil Co., Paris, Texas							
B 5972	Climax Brand Cottonseed Cake or Meal	{ G† P†	7.6	43.0 42.2	6.0 8.4	18.0 9.4	62.00
B 6160	Climax Brand Cottonseed Cake or Meal	{ G† P†	7.9	43.6	9.4	6.0	65.00
	Average		7.8	42.9	8.9	7.7	
Texas Cake & Linter Co., Dallas, Texas							
B 5995	Higrade Brand Prime Cottonseed Cake and Meal	{ G† P†	8.3	46.0 43.9	6.0 6.3	10.0 8.7	.....
B 6150	Panhandle Brand Good Cottonseed Meal	{ G† P†	7.9	39.0	6.0	20.0	60.64
B 6168	Panhandle Brand Good Cottonseed Meal	{ G† P†	8.1	35.2	8.7	12.4	48.00
B 6244	Panhandle Brand Good Cottonseed Meal	{ G† P†	8.5	37.5	7.9	10.8	54.00
B 6274	Panhandle Brand Good Cottonseed Meal	{ G† P†	8.7	35.9	7.6	12.0	50.00
B 6404	Panhandle Brand Good Cottonseed Meal	{ G† P†	8.3	36.6	7.9	11.4	.....
	Average		8.3	37.6	8.2	8.4	.....
	Average		8.3	36.4	8.1	11.0	.....
Texoma Brand Prime Cottonseed Cake and Meal							
B 5943	Texoma Brand Prime Cottonseed Cake and Meal	{ G† P†	7.4	43.0	6.0	18.0	67.00
B 5947	Texoma Brand Prime Cottonseed Cake and Meal	{ G† P†	7.2	45.5	8.3	7.7	65.00
B 6207	Texoma Brand Prime Cottonseed Cake and Meal	{ G† P†	7.5	46.9	7.6	6.9	60.00
	Average		7.4	46.3	8.0	7.0	60.00
	Average		7.4	46.2	8.0	7.2

FEEDING STUFFS

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Wagner-White Co., Jackson, Mich.

B 5931	Waw-Co 43% Cottonseed Meal	43.0	8.7	6.0	9.0	72.00
B 5932	Waw-Co 43% Cottonseed Meal	44.5	7.9	7.5	10.7	3.75
B 5933	Waw-Co 43% Cottonseed Meal	43.5	7.6	8.0	9.6	60.00
B 5934	Waw-Co 43% Cottonseed Meal	43.1	7.6	8.0	9.0	3.50
B 6000	Waw-Co 43% Cottonseed Meal	43.7	7.0	7.3	9.5	60.00
B 6007	Waw-Co 43% Cottonseed Meal	42.7	7.6	8.3	8.1	60.00
B 6136	Waw-Co 43% Cottonseed Meal	42.0	7.6	8.3	9.2	60.00
B 6139	Waw-Co 43% Cottonseed Meal	43.0	7.6	8.3	9.2	60.00
B 6333	Waw-Co 43% Cottonseed Meal	43.9	7.9	7.3	9.6	60.00
B 6412	Waw-Co 43% Cottonseed Meal	41.7	8.2	7.7	9.8	45.00
	Average	43.9	7.6	7.9	8.9	

A. C. Westervelt & Co., Memphis, Tenn.

B 5936	Planet Brand Cottonseed Meal	45.0	8.3	6.0	10.0	60.00
B 5993	Planet Brand Cottonseed Meal	46.3	8.9	8.8	8.3	58.00
B 6008	Planet Brand Cottonseed Meal	44.0	7.7	7.7	7.8	60.00
B 6009	Planet Brand Cottonseed Meal	45.9	7.4	6.9	6.1	60.00
B 6011	Planet Brand Cottonseed Meal	43.3	7.4	7.4	7.8	60.00
B 6012	Planet Brand Cottonseed Meal	45.4	7.4	6.8	6.1	60.00
B 6018	Planet Brand Cottonseed Meal	44.6	7.2	8.0	5.6	60.00
B 6032	Planet Brand Cottonseed Meal	45.7	7.2	8.1	5.0	60.00
B 6033	Planet Brand Cottonseed Meal	45.1	7.3	8.2	7.4	60.00
B 6034	Planet Brand Cottonseed Meal	43.5	6.7	7.7	7.0	60.00
B 6036	Planet Brand Cottonseed Meal	46.3	7.5	9.6	5.6	60.00
B 6080	Planet Brand Cottonseed Meal	44.3	8.2	7.4	7.4	60.00
B 6135	Planet Brand Cottonseed Meal	44.1	8.3	7.5	7.4	60.00
B 6235	Planet Brand Cottonseed Meal	44.1	8.8	7.4	7.4	60.00
B 6407	Planet Brand Cottonseed Meal	45.2	8.8	7.9	7.0	60.00
	Average	44.9	7.8	7.8	6.8	

Willingham Warehouse Co., Dallas, Texas

B 6078	Superior Brand Choice Cottonseed Meal	43.0	7.5	6.0	10.0	2.50
B 6335	Superior Brand Choice Cottonseed Meal	43.4	8.3	6.5	9.4	2.25
	Average	43.3	7.9	6.9	9.3	

J. N. Willis Cotton Products Co., Dallas, Tex.

B 5944	Ordinary Cottonseed Meal	45.0	8.2	6.0	14.0	67.00
B 5948	Ordinary Cottonseed Meal	45.2	8.1	7.9	8.0	65.00
B 6010	Ordinary Cottonseed Meal	43.2	8.0	7.0	8.8	60.00
	Average	46.2	8.1	7.5	8.0	

†Abbreviations for Guaranteed and POUND.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
COTTONSEED MEAL.—Cont.							
E. H. Young Co., Inc., Dallas, Texas							
B 6014	Young's Forty-Three Prime Cottonseed Meal & Cake	Saline.....	8.7	45.0	6.0	12.0	.....
B 6098	Young's Forty-Three Prime Cottonseed Meal & Cake	Jackson.....	8.7	45.8	8.9	7.1	.....
B 6117	Young's Forty-Three Prime Cottonseed Meal & Cake	Wayland.....	8.7	44.7	7.0	7.9	\$2.30
B 6179	Young's Forty-Three Prime Cottonseed Meal & Cake	Hudsonville.....	7.1	44.4	7.9	7.6	71.00
B 6380	Young's Forty-Three Prime Cottonseed Meal & Cake	Morenci.....	9.1	43.1	7.9	8.8	66.00
		Morenci.....	8.3	47.1	7.6	7.4	.....
	Average.....	Average.....	8.4	45.0	7.9	7.8	.....
COTTONSEED FEED							
B 6106	Fox Brand Cottonseed Feed	Augusta.....	10.8	19.4	3.1	25.2	.....
B 6107	Fox Brand Cottonseed Feed	Augusta.....	8.7	20.1	3.8	25.4	.....
	Average.....	Average.....	9.8	19.8	3.5	25.3	.....
LINSEED MEAL							
B 6025	American Linseed Co., Buffalo, N. Y.	Bay City.....	10.3	35.7	5.7	8.0	3.30
	Old Process Linseed Oil Meal	Bay City.....	10.3	35.7	5.7	8.0	.....
American Milling Co., Peoria, Ill.							
B 6184	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed	Conklin.....	10.6	30.0	6.0	10.0	.....
B 6184	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed	Nunica.....	11.1	30.6	5.6	8.8	.....
B 6238	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed	Zeeland.....	10.2	32.6	6.3	8.6	65.00
B 6377	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed	Morenci.....	10.0	31.3	5.7	8.0	50.00
B 6507	Amco Old Process Linseed Meal and Old Process Screenings Oil Feed	Morenci.....	10.0	31.3	5.5	9.2	.....
		Battle Creek.....	10.2	32.0	5.7	8.2	45.00
	Average.....	Average.....	10.4	31.5	5.7	8.7	.....

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
CORN GLUTEN FEED							
B 5935	Corn Products Refining Co., New York, N. Y.	Washington.....	{ G.† F.†	23.0	1.0	8.6	.....
B 5940	Buffalo Corn Gluten Feed.....	Nelson.....	9.7	30.3	3.2	5.6	.....
B 6076	Buffalo Corn Gluten Feed.....	Birmingham.....	9.0	26.3	3.0	7.3	.....
B 6174	Buffalo Corn Gluten Feed.....	Sparta.....	10.8	26.4	2.7	8.3	\$2.90
B 6288	Buffalo Corn Gluten Feed.....	Holland.....	9.0	28.0	2.2	9.6	\$9.00
	Average.....		9.8	25.8	3.4	7.0	\$3.00
The Huron Milling Co., Harbor Beach, Mich.							
	Jenks Corn Gluten Feed.....		9.7	27.4	4.1	7.0	.....
B 6209	Jenks Corn Gluten Feed.....	Kalamazoo.....	{ G.† F.†	22.0	3.0	8.0	.....
B 6400	Jenks Corn Gluten Feed.....	Harbor Beach.....	9.4	29.2	2.2	0.6	3.50
	Average.....		9.1	24.4	2.9	7.3	.....
HOMINY FEED							
B 6511	Kellogg Toasted Corn Flake Co., Battle Creek, Mich.	Battle Creek.....	{ G.† F.†	10.0	6.0	6.0	28.00
	B. C. White Hominy Feed.....		8.6	9.5	7.2	5.6	.....
B 6520	Postum Cereal Co., Battle Creek, Mich.	Battle Creek.....	{ G.† F.†	10.0	6.0	5.0	32.00
	Burt's Hominy Feed.....		8.7	10.6	6.4	3.8	.....
B 6371	CORN FEED MEAL Amendt Milling Co., Monroe, Mich.	Monroe.....	{ G.† F.†	8.6	2.6	6.6	24.00
	"Amco" Corn Feed Meal.....		10.8	9.6	4.2	2.8	.....

B 6299	Armour Grain Co., Battle Creek, Mich. Corn Feed.....	Battle Creek.....	{ F. }	..... 6.5	7.0 10.0	0.5 1.8	1.5 1.1	30.00
B 6362	Commercial Milling Co., Detroit, Mich. Henkel's Coarse Feed Corn Meal.....	Detroit.....	{ F. }	..... 11.2	9.0 9.9	5.0 5.2	5.0 3.2	.....
B 6190	Hankey Milling Co., Petoskey, Mich. Corn Feed Meal.....	Petoskey.....	{ F. }	..... 13.6	8.7 9.4	5.3 3.5	3.4 2.0	40.00
B 5914	Saginaw Milling Company, Saginaw, Mich. Corn Feed Meal.....	Saginaw.....	{ F. }	..... 11.4	10.0 11.4	6.0 6.2	7.0 3.7	48.00
B 6355	David Stott Flour Mills Co., Detroit, Mich. Corn Feed Meal.....	Detroit.....	{ F. }	..... 12.6	8.5 10.3	3.5 6.4	4.0 3.7	.....
B 6171 B 6198	Watson Higgins Milling Co., Grand Rapids, Mich. Corn Feed..... Corn Feed.....	Grand Rapids..... Grand Rapids.....	{ F. }	..... 13.0 12.6	9.5 9.2 9.2	5.0 3.5 3.7	8.0 2.3 2.3	42.80
	Average.....			12.8	9.2	3.6	2.3	
B 6086	ANIMAL BY-PRODUCTS Armour Fertilizer Works, Chicago, Ill. Armour's Meat Scraps Medium Meat Residue.....	Pontiac.....	{ F. }	..... 6.6	55.0 61.3	6.0 9.4	2.0 2.5	6.75
B 6502	E. H. Bok & Dr. Tacoma, Hudsonville, Mich. Tankage.....	Hudsonville.....	{ F. }	..... 8.7	50.4	14.7	1.0	.....

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
ANIMAL BY-PRODUCTS—Cont.							
B 6245	Chicago Feed & Fertilizer Co., Chicago, Ill. Magic Brand Meat Scraps	Comstock Park..... { G.† P.†	..... 6.7	60.0 53.3	2.0 9.2	3.0 1.7	\$4.75
B 6128	Darling & Company, Chicago, Ill. Darling's Granulated Bone	Grand Rapids..... { G.† P.†	..... 7.6	20.0 25.7	0.6 3.0	3.0 1.4	.....
B 6129	Darling's Meat Scraps	Grand Rapids..... { G.† P.†	..... 9.5	60.0 51.3	0.6 8.2	3.0 2.8	.....
B 6203	Grand Ledge Rendering Co., Grand Ledge, Mich. Tankage	Grand Ledge..... { G.† P.†	..... 6.7	40.0 41.9	15.6 16.2	3.0 1.7	.....
B 6286	Hartman Tankage Works, Grand Rapids, Mich. Tankage	Grand Rapids..... { G.† P.†	..... 7.9	49.9 53.1	9.8 12.3	0.8 0.8	4.50
B 6526	Morris & Company, Chicago, Ill. Big Sixty Meat Meal Digester Tankage	Buchanan..... { G.† P.†	..... 10.2	60.0 59.9	6.0 5.7	6.0 1.4	.....
B 5997	J. L. & H. Stadler Rendering & Fertilizer Co., Cleveland, O. Stadler's 60% Digester Tankage	Adrian..... { G.† P.†	..... 11.3	60.0 63.4	1.0 5.6	4.0 1.6	4.00

B 6521	Standard Tankage.....	Standard Chemical Corp., Kalamazoo, Mich.	{ G† F†	6.5	27.6	16.3	1.3	.....
B 6015	Red "W" Brand Protein Tankage.....	Wilson & Co., Chicago, Ill.	{ G† F†	6.7	80.0 87.4	8.0	8.0 6.4	.....
B 6046	Alfalfa Meal.....	ALFALFA MEAL The Albert Dickinson Co., Chicago, Ill.	{ G† F†	9.1	18.0 16.4	1.0 1.3	36.0 28.8	2.50
B 6317	Badger Alfalfa Meal.....	Chas. A. Krause Milling Co., Milwaukee, Wis.	{ G† F†	9.5	14.0 15.2	1.0 1.6	30.0 27.5	2.50
B 6380	Trifalfa Meal.....	Triangle Milling Co., Kansas City, Mo.	{ G† F†	10.0	14.0 18.8	1.6 1.9	30.0 24.4	.....
B 6259	Alfalfa Meal.....	H. P. Zwemer & Son, Holland, Mich.	{ G† F†	11.1	16.9	1.5	24.6	.....

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
CALF MEAL								
B 6143	American Milling Company, Peoria, Ill.	Conklin	{ G.† F.† 9.6	20.0	4.0	8.0	.....	Linseed meal, corn meal, wheat middlings, bone meal, blood flour, dried buttermilk, soluble starch, malt flour.
				19.3	4.5	6.0		
B 6397	Arcady Farms Milling Co., Chicago, Ill.	Ypsilanti	{ G.† F.† 10.5	25.0	5.0	7.0	.....	Cottonseed meal, linseed meal, wheat flour, oat meal, powdered milk and salt.
				23.5	4.6	4.2		
B 6301	The J. E. Bartlett Co., Jackson, Mich.	Jackson	{ G.† F.† 7.0	21.0	3.0	4.0	\$5.00	Cottonseed meal, malt, ground and baked corn, wheat and barley, blood meal, flaxseed products, salt and sugar.
				21.9	3.0	3.6		
B 6268	Ralston Purina Co., St. Louis, Mo.	Cadillac	{ G.† F.† 11.2	27.0	3.8	4.5	5.00	Linseed meal, hominy feed, corn feed meal, wheat flour, blood flour and salt.
				28.3	3.0	3.1		
B 6273	Ryde & Company, Chicago, Ill.	Big Rapids	{ G.† F.† 11.3	25.0	5.0	6.7	5.00	Cottonseed meal, linseed meal, coconut meal, malt flour, hominy feed, wheat flour, ground flaxseed, blood flour, cocoa shell meal, salt, anise, Foerugreek, locust, bean meal, ground beans and lentils.
				24.4	4.0	6.2		

B 6240	The Western Feed Mfrs., Inc., Chicago, Ill.	Gro-Big Calf Meal (with dried buttermilk).....	Zeeland.....	{ G.† P.†	.....11.5	18.0 14.0	4.0 3.7	4.0 2.5	.....	Red dog flour, linseed meal, corn flour, oat flour, bone meal, blood meal, alfalfa meal, dried buttermilk, salt, calcium carbonate, dried skim milk, dextrose.
B 6370	HOG FEEDS Amendt Milling Co., Monroe, Mich.	"Amco Pig" Feed.....	Monroe.....	{ G.† P.†	.....10.0	16.0 22.7	4.5 4.0	8.0 6.3	48.00	Linseed meal, gluten feed, cracked corn, corn feed meal, middlings, barley, ground oats, dried buttermilk, tankage and salt.
B 6167	Arcady Farms Milling Co., Chicago, Ill.	Arcady Hog Meal & Humus.....	Ravenna.....	{ G.† P.†	.....11.5	18.0 18.9	4.5 5.1	7.0 7.8	80.00	Humus, digester tankage, linseed meal, screenings, hominy feed, corn oilcake meal, corn feed meal, wheat middlings, molasses.
B 6328	Caughey-Jossman Co., Detroit, Mich.	Common Sense Hog Meal.....	Detroit.....	{ G.† P.†	.....11.4	18.0 17.6	5.5 5.0	10.0 8.3	46.00	Cottonseed meal, linseed meal, corn meal, wheat bran and middlings, oat meal mill by-product, buckwheat hulls.
B 6016	Corn Products Refining Co., New York, N. Y.	Diamond Hog Meal.....	Saline.....	{ G.† P.†	.....10.2	18.0 23.7	7.0 8.3	13.0 8.0	.....	Corn oil cake meal.
B 6083	The C. E. DePuy Company Pontiac, Mich.	Pig Meal.....	Pontiac.....	{ G.† P.†	.....12.0	18.5 13.2	8.7 3.8	7.0 5.1	50.00	Linseed meal, ground corn, wheat bran and middlings, ground barley and ground oats.
B 6248	Hales & Hunter Co., Chicago, Ill.	College Hog Feed.....	Muskegon.....	{ G.† P.†	.....10.9	16.0 17.4	4.0 4.2	9.0 9.0	62.00	Corn feed meal, wheat bran, flour middlings, ground oats, digester tankage, alfalfa meal, ground barley and salt.

Abbreviations for Guaranteed and Pounds.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
HOG FEEDS.—Cont.								
Chas. A. Krause Milling Co., Milwaukee, Wis.								
B 6079	Badger Homohog Feed	Pontiac..... {G† {P†	10.0	13.0	6.0	4.6	\$2.50	Corn germ meal, hominy feed, corn red dog flour, tankage and salt. Same as B 6079.
B 6125	Badger Homohog Feed	Coopersville.....	10.3	15.9	6.6	4.6		
		Average.....	10.2	13.3	4.8	3.5		
				14.6	5.7	4.1		
The McMillen Co., Fort Wayne, Ind.								
B 6153	Wayne Hog Feed with Molasses.	Marcellus..... {G† {P†	10.7	17.6	4.0	9.0		Linsced meal, cocoanut meal, corn germ meal, ground corn, wheat middlings, ground barley, red dog flour, tankage, alfalfa meal, molasses, gluten feed and salt.
				20.2	3.4	7.6		
Park & Pollard Co., Chicago, Ill.								
B 6231	"Go-Tu-It" Hog Ration.	Muskegon Heights.. {G† {P†	10.4	15.0	6.0	13.0	3.00	Linsced meal, cocoanut meal, peanut meal, hominy feed, corn germ meal, corn feed meal, wheat middlings, meat, fish, bone meal, alfalfa meal, rice bran, calcium carbonate, oat meal mill by-products, velvet bean meal and salt.
				18.7	4.4	10.2		
Ralston Purina Co., St. Louis, Mo.								
B 6234	Purina Pig Chow	Holland..... {G† {P†	13.2	15.0	8.6	9.0	66.00	Linsced meal, gluten feed, corn meal, hominy feed, digester tankage, alfalfa meal, molasses, charcoal and salt.
				15.9	3.6	5.1		
DAIRY AND STOCK FEEDS								
Amendt Milling Co., Monroe, Mich.								
B 6389	"Amco" Dairy Feed	Monroe..... {G† {P†	8.9	22.0	6.0	13.0	48.00	Cottonseed meal, linsced meal, brewers' grains, gluten feed, corn feed meal, wheat bran and middlings, vinegar grains.
				24.8	5.5	10.0		

B 6194	J. J. Badenoeh Company, Chicago, Ill. Graingold Dairy Ration.....	Petoakey..... { G. F. }	..... 10.5	26.0 26.0	5.0 5.6	14.0 8.8	Cottonseed meal, linseed meal, peanut meal, gluten feed, hominy feed, corn feed meal, wheat bran and middlings, oats, barley and salt.
B 6193	Milky Way Dairy Ration.....	Petoakey..... { G. F. }	..... 10.4	20.0 23.3	5.0 4.7	12.0 11.3	Cottonseed meal, linseed meal, peanut meal, gluten feed, corn feed meal, wheat bran and midds, bar- ley, clipped oat by-product, cal- cium phosphate and salt.
B 6229	Milky Way Dairy Ration.....	Holland.....	11.0	21.1	4.5	7.9	Same as B 6193; without calcium phosphate and corn feed meal.
	Chas. F. Bartlett Co., Grand Rapids, Mich. Economy Ready Ration Dairy Feed.....	Average.....	10.7	22.2	4.6	9.6	
B 6144	Economy Ready Ration Dairy Feed.....	Augusta..... { G. F. }	..... 7.9	26.0 26.8	5.6 5.9	14.0 12.2	Cottonseed meal, linseed meal, brewers' grains, gluten feed, ground wheat, wheat bran and middlings and rice bran.
B 6199	Economy Ready Ration Dairy Feed.....	Augusta.....	8.5	28.0	6.0	11.1	Same as B 6144, without wheat middlings and ground wheat; with CXX Feed.
B 6200	Economy Ready Ration Dairy Feed.....	Augusta.....	8.9	25.3	6.7	11.2	Same as B 6199.
	Caughy-Jossman Co., Detroit, Mich. Common Sense Dairy Feed.....	Average.....	8.4	26.7	6.2	11.5	
B 6325	Common Sense Dairy Feed.....	Detroit..... { G. F. }	..... 10.4	20.0 18.3	5.0 5.0	11.0 12.0	Cottonseed meal, linseed meal, gluten feed, corn meal, ground kafir corn, wheat bran and mid- dlings, alfalfa meal, oat meal mill by-product, buckwheat hulls.
B 6123	Chapin & Company, Chicago, Ill. Acorn Dairy Feed.....	Coopersville..... { G. F. }	..... 9.7	20.0 18.9	3.0 3.1	10.0 6.8	Cottonseed meal, linseed meal, corn gluten feed, corn feed meal, kafir corn, wheat bran, cocoanut meal, ivory nut meal and salt.
B 6085	The C. E. DePuy Co., Pontiac, Mich. The C. E. DePuy Co.'s Dairy Feed.....	Pontiac..... { G. F. }	..... 10.9	17.3 20.0	4.0 4.9	9.2 6.5	Cottonseed meal, linseed meal, corn cob meal, barley, oats, oat meal mill by-product, salt.

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
DAIRY AND STOCK FEEDS —Cont.								
B 6289	Hi-Value Stock Feed. Harris Milling Co., Mt. Pleasant, Mich.	Cadillac.....	{ G.† P.†	18.0 11.5	5.5 3.8	7.0 5.5	\$46.00	Linseed meal, corn, kaffir corn, milo, barley, oats, wheat bran and middlings, corn feed meal.
			11.4					
B 6161	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Cream City Dairy Feed.....	Niles.....	{ G.† P.†	20.0 21.3	4.5 4.2	16.0 10.4	.....	Cottonseed meal, linseed meal, brewers' grains, malt sprouts, corn germ meal, gluten feed, hominy feed, wheat bran and middlings, oat meal mill by-products, copra meal, salt.
			11.9					
B 6254	Badger Cream City Dairy Feed.....	Hudsonville.....		20.0	5.0	11.6	55.00	Same as B 6161, without copra meal, with corn feed meal.
			11.5	20.7	4.6	11.0		
B 6278	Badger Monopoly Feed.....	Grand Haven.....	{ G.† P.†	9.0 10.1	5.5 3.2	8.0 4.9	2.25	Corn, kaffir corn, barley, oats.
			12.2					
B 6187	Krause Dairy Feed.....	Petoskey.....	{ G.† P.†	24.0 24.0	5.0 5.9	10.0 10.1	70.00	Cottonseed meal, linseed meal, brewers' grains, malt sprouts, gluten feed, hominy feed, corn germ meal, wheat bran and middlings, copra meal, salt.
			11.3					
B 6257	Krause Dairy Feed.....	Holland.....		23.9	5.5	8.4	60.00	Same as B 6187, with corn feed meal.
			11.1	23.9	5.7	9.3		
		Average.....						

**The Larrowe, Milling Co.,
Detroit, Mich.**

B 6068

Larro-Feed.....

B 6246

Larro-Feed.....

**Lichtenberg & Son,
Detroit, Mich.**

B 6343

Lichtenberg's Chop Feed.....

**Nowak Milling Co.,
Buffalo, N. Y.**

B 6132

Domino Creamery Feed.....

B 6125

Domino Creamery Feed.....

B 6228

Domino Creamery Feed.....

B 6295

Domino Creamery Feed.....

E 6133

Domino 24½ Dry Dairy Ration.....

E 6296

Domino 24½ Dry Dairy Ration.....

**Norton-Smith Feed Co.,
Detroit, Mich.**

B 5951

Milkmoor Dairy Feed.....

Cottonseed meal, linseed meal,
gluten feed, wheat bran and mid-
dlings, dried beet pulp and salt.
Same as B 6068.

Con. meal, oat hulls, oat clippings.

Cottonseed meal, linseed meal,
gluten feed, wheat bran, coconut
oil meal, salt, ground and boiled
grain screenings, brewers' grains.
Same as B 6132, without gluten
feed.

Same as B 6132, with coconut
oil meal.

Same as B 6132.

Cottonseed meal, linseed meal,
gluten feed, corn feed meal, wheat
bran, alfalfa meal, coconut oil
meal.

Same as B 6133.

Cottonseed meal, linseed meal,
gluten feed, corn, wheat bran and
middings, barley, oat feed, screen-
ings, cocoa shell meal and salt.

Mason.....	{G.† P.†}	9.4	20.0 21.1	3.5 3.8	14.0 10.8	60.00	
Comstock Park.....		10.2	22.1	4.5	11.1	55.00	
Average.....		9.8	21.6	4.2	11.0		
Detroit.....	{G.† P.†}	11.7	20.0 8.9	3.5 3.7	9.0 5.9	27.00	
Hamilton.....	{G.† P.†}	9.9	20.0 21.3	4.0 5.4	15.0 12.3		
Zeeland.....		8.8	21.1	5.5	12.5	60.00	
Holland.....		10.5	18.0	5.3	11.5	60.00	
Muskegon.....		10.2	18.9	4.0	10.1		
Average.....		9.9	19.8	5.1	11.6		
Hamilton.....	{G.† P.†}	10.1	24.5 28.7	4.5 6.3	15.0 11.0		
Muskegon.....		10.1	26.6	6.0	11.9		
Average.....		10.1	27.7	6.2	11.5		
Romeo.....	{G.† P.†}	9.4	20.0 20.4	4.0 5.3	10.0 11.8	65.00	

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
	DAIRY AND STOCK FEEDS —Cont.							
	Park & Pollard Co., Chicago, Ill.							
B 5929	Stevens "44" Dairy Ration.....	Powerville..... { G† P†	9.6	24.0 24.3	5.0 7.1	16.0 10.1	\$74.50	Cottonseed meal, linseed meal, coconut oil meal, brewers' grains, corn distillers' trunks, gluten feed, hominy meal, corn meal, wheat meal and middlings, buckwheat, grits, pea bran and salt.
B 5939	Stevens "44" Dairy Ration.....	Mason.....	8.9	24.5	7.0	10.8	3.00	Same as B 5929, without wheat meal and pea bran; with wheat bran and pea meal.
B 6134	Stevens "44" Dairy Ration.....	Hamilton.....	9.1	25.2	6.4	11.4	.....	Same as B 5929, without wheat meal and buckwheat grits; with wheat bran, pea meal, barley and buckwheat bran.
B 6227	Stevens "44" Dairy Ration.....	Holland..... Average.....	9.8 9.4	24.8 24.7	6.9 6.9	10.8 10.8	66.00	Same as B 5929, without wheat meal and pea bran; with wheat bran, pea meal and barley.
B 6115	Pillsbury Flour Mills Co., Minneapolis, Minn. Pillsbury's Dairy Ration.....	Wayland..... { G† F†	9.5	19.0 19.4	4.0 5.1	11.0 10.0	60.00	Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran and middlings, oats and salt.
B 6111	Quaker Oats Co., Chicago, Ill. Schumacher Feed.....	Grand Rapids..... { G† P†	8.7	10.0 11.4	3.3 3.4	13.0 11.0	55.00	Cottonseed meal, linseed meal, hominy feed, corn, wheat bran and middlings, barley, oat meal and by-product, puffed rice, yellow hominy feed, calcium phosphate and salt.
B 6267	Schumacher Feed.....	Cadillac..... Average.....	10.1 9.4	11.4 11.4	3.0 3.2	10.3 10.7	40.00	Same as B 6111, without calcium phosphate; with puffed wheat.

B 5913	Saginaw Milling Co., Saginaw, Mich. Pioneer Stock Feed.....	{ G:† F:†	..... 11.3	10.6 12.0	2.0 3.6	5.0 5.7	56.00	Corn meal, bran, barley and oats.
B 6311	Scheuren-Mok Mill Co., Detroit, Mich. Eagle Chop Feed.....	{ G:† F:†	..... 12.9	9.0 7.9	3.0 2.4	7.0 5.3	3.00	Corn meal, corn bran, barley hulls, oat hulls, ground screenings.
B 6324	Smith Milling Company, Milwaukee, Wis. (Successors to Smith-Parry & Co.) Vitex Dairy Feed.....	{ G:† P:†	..... 9.7	24.0 26.8	6.0 6.2	11.0 9.9	58.00	Cottonseed meal, linseed meal, brewers' grains, distillers' grains, malt sprouts, gluten feed, hominy feed, corn oil meal, wheat bran and salt.
B 6352	David Stott Flour Mills Co., Detroit, Mich. Stott's Winner Feed.....	{ G:† F:†	..... 11.0	8.5 9.1	3.5 4.0	10.0 7.0	.....	Ground corn, corn feed meal, oats, oat meal mill by-products, salt.
B 5928	The Ubiko Milling Co., Cincinnati, O. Union Grains, Ubiko, Biles Ready Dairy Ration.....	{ G:† F:†	..... 9.8	24.0 25.0	5.0 6.8	10.0 8.5	77.40	Cottonseed meal, linseed meal, cocoanut oil meal, brewers' grains, corn distillers' grains, gluten feed, hominy meal, wheat bran and middlings, salt.
B 6095	Western Feed Mfrs., Inc., Chicago, Ill. Union Grains, Ubiko, Biles Ready Dairy Ration.....	..... Average.....	10.0 9.9	24.3 24.7	6.5 6.7	8.7 8.6	54.00	Same as B 5928.
B 5924	Big Flo Dairy Feed.....	{ G:† F:†	..... 9.8	24.0 23.1	5.0 7.1	10.0 11.2	3.90	Cottonseed meal, linseed meal, gluten feed, wheat bran and mid- dlings, rice bran, rice polish and salt.
B 6290	Big Flo Dairy Feed.....	..... Average.....	10.0 9.9	23.6 22.4	5.8 6.5	10.9 11.0	.....	Same as B 5924, without rice pol- ish and salt; with ground barley and alfalfa meal.

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
DAIRY AND STOCK FEEDS —Cont.								
Western Grain Products Co., Hammond, Ind.								
B 6131	Calumet Dairy Feed.....	Grand Rapids..... { G.† F.†	9.4	20.0 20.8	4.0 5.5	13.5 12.6	.....	Cottonseed meal, linseed meal, brewers' grains, gluten feed, corn, wheat bran, re-cleaned wheat screenings, clipped oat by-product.
B 6504	Peerless Dairy Ration.....	Battle Creek..... { G.† F.†	9.6	22.0 24.1	4.5 5.4	9.5 8.0	\$45.00	Cottonseed meal, linseed meal, gluten feed, brewers' grains, malt feed, corn feed meal, wheat bran and middings, oats, cooked corn grits and salt.
MOLASSES DAIRY AND STOCK FEEDS								
American Milling Co., Peoria, Ill.								
B 6165	Amco Dairy Feed.....	Conklin..... { G.† F.†	12.0	26.0 24.8	6.0 5.4	8.0 10.8	.....	Cottonseed meal, linseed meal, cocoanut meal, peanut meal, distillers' grains, gluten feed, wheat bran, alfalfa meal, molasses, calcium carbonate and salt.
B 6172	Amco Dairy Feed.....	Sparta.....	10.3	27.4	5.7	9.0	68.00	Same as B 6165.
B 6378	Amco Dairy Feed.....	Morenci.....	10.4	28.4	4.4	7.6	.....	Same as B 6165, without calcium carbonate.
Empire 20% Dairy Feed								
B 6137	Average..... { G.† F.†	10.9	26.9	5.2	9.1	Cottonseed meal, linseed meal, cocoanut oil meal, peanut meal, distillers' grains, gluten feed, corn feed meal, wheat bran, alfalfa meal, molasses, salt and calcium carbonate.
	Hamilton..... { G.† F.†	10.3	20.0 23.3	4.5 4.7	8.0 8.3	

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B 6279	Empire 20% Dairy Feed.....	Grand Haven.....	11.4	24.9	4.1	6.6	54.00	Same as B 6137, without calcium carbonate.
B 6379	Empire 20% Dairy Feed.....	Morenci.....	9.8	24.1	4.7	7.1	.....	Same as B 6379.
		Average.....	10.5	24.1	4.5	7.3	.....
B 6173	Sucrene Dairy Feed.....	Sparta..... { G† P† }	..... 11.2	16.5 16.6	3.5 4.6	10.0 11.6	52.00	Cottonseed meal, linseed meal, coconut oil meal, distillers' grains, corn feed meal, salt, clipped oat by-products, ground screenings, wheat bran, calcium carbonate.
Arcady Farms Milling Co., Chicago, Ill.								
B 6166	Arcady Dairy Feed.....	Ravenna..... { G† P† }	..... 11.6	16.5 16.3	3.5 5.4	13.5 12.4	65.00	Cottonseed meal, linseed meal, gluten feed, wheat bran, cleaned, ground and bolted wheat screenings, ground and bolted clipped oat by-product molasses and salt.
B 6093	Arco Milk Ration.....	Ann Arbor..... { G† P† }	..... 10.8	20.0 20.2	4.0 4.7	12.0 11.3	52.00	Cottonseed meal, linseed meal, gluten feed, wheat bran and middlings, screenings molasses, clipped oat by-product, salt, oatmeal mill by-product, corn oil cake meal.
B 6169	Arco Milk Ration.....	Grand Rapids.....	11.1	21.1	5.4	10.2	54.00	Same as B 6093, with corn feed meal.
B 6291	Arco Milk Ration.....	Belmont.....	12.0	20.8	5.4	11.2	51.00	Same as B 6093, without oat meal mill by-product.
		Average.....	11.3	20.7	5.2	10.9	.....
B 6170	Certified Dairy Feed.....	Grand Rapids..... { G† P† }	..... 11.4	25.0 24.5	5.0 5.4	11.0 9.8	64.00	Cottonseed meal, linseed meal, brewers' grains, coconut oil meal, distillers' grains, gluten, hominy feed, wheat bran and middlings, molasses and salt.
B 6396	Producers Ready Ration with Beet Pulp.....	Ypsilanti..... { G† P† }	..... 11.6	21.0 24.8	4.0 4.0	10.0 7.3	.....	Cottonseed meal, linseed meal, gluten feed, corn feed meal, wheat bran, dried beet pulp, molasses and salt.
B 5974	Red D Dairy Feed.....	Milford..... { G† P† }	..... 11.2	24.0 23.8	5.0 5.3	10.0 7.9	.....	Cottonseed meal, linseed meal, dried grains (barley, malt and corn), corn germ meal, gluten feed, wheat bran and middlings, molasses and salt.

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
	MOLASSES DAIRY AND STOCK FEEDS.—Cont.							
	Arcady Farms Milling Co.—Cont.							
B 6092	Red D Dairy Feed.....	Ann Arbor.....	10.4	25.5	5.9	9.4	\$2.70	Same as B 6074.
B 6292	Red D Dairy Feed.....	Belmont.....	12.5	24.8	5.9	8.1	54.00	Same as B 5974, with brewer's grains and dried beet pulp.
		Average.....	11.4	24.7	5.7	8.5		
	Grain Belt Mills Co., So. St. Joseph, Mo.							
B 6120	Gee Bee Dairy Feed.....	{ G.† P.†	11.2	20.0 20.7	3.0 3.7	12.0 10.8		Cottonseed meal, corn germ meal, wheat bran, alfalfa, molasses, corn feed meal, salt.
B 6119	Grain Belt Red D Dairy Feed.....	{ G.† P.†	12.6	16.0 18.3	4.0 4.8	16.0 12.0		Cottonseed meal, corn feed meal, alfalfa meal, molasses, wheat screenings and salt.
	Chas. A. Krause Milling Co., Milwaukee, Wis.							
B 6077	Badger Dairy Feed.....	{ G.† P.†	10.0	16.6 18.4	3.6 3.4	18.0 24.5	2.65	Cottonseed meal, ground screenings, alfalfa meal, flax plant by-product, molasses and salt.
B 6114	Badger Dairy Feed.....	Grand Rapids.....	8.2	18.0	5.6	20.5	53.00	Same as B 6077.
B 6124	Badger Dairy Feed.....	Coopersville.....	9.4	17.6	6.4	19.0		Same as B 6077.
B 6162	Badger Dairy Feed.....	Niles.....	10.0	20.2	4.3	18.9		Same as B 6077.
		Average.....	9.4	17.8	4.9	20.7		
B 6276	Record Maker Dairy Feed.....	{ G.† P.†	12.0	21.0 20.6	4.6 3.5	19.0 7.6		Cottonseed meal, linseed meal, gluten feed, hominy feed, wheat bran, ground oats, alfalfa meal, molasses, copra meal and salt.

B 6344	Lichtenberg & Son, Detroit, Mich. Paramel Dairy Feed.....	Detroit.....	{ G.† F.†	.....	23.0 21.7	4.0 5.2	12.0 10.7	43.00	Cottonseed meal, brewers' grains, distillers' grains, corn feed meal, wheat bran and middlings, gluten feed, oat hulls, molasses and salt.
B 6042	Ralston Purina Co., St. Louis, Mo. Purina Cow Chow Feed.....	Port Huron.....	{ G.† F.†	.....	24.0 27.8	4.3 4.4	12.0 10.4	3.25	Cottonseed meal, linseed meal, gluten feed, hominy feed, alfalfa, molasses and salt.
B 6206	Purina Cow Chow Feed.....	Greenville.....	.....	10.5	26.1	4.2	11.3	60.00	Same as B 6042, with corn feed meal.
B 6230	Purina Cow Chow Feed.....	Holland.....	.....	11.0	26.6	4.1	8.8	66.00	Same as B 6042.
	Western Feed Mfrs., Inc., Chicago, Ill. "Rep" Dairy Feed.....	Average.....	.....	10.4	26.8	4.2	10.2		
B 5919	Western Grain Products Co., Hammond, Ind. Hammond Dairy Feed.....	Lansing.....	{ G.† F.†	.....	16.0 15.1	3.0 3.9	10.0 8.8	3.75	Cottonseed meal, gluten feed, corn feed meal, wheat bran and mid- dlings, molasses, oat hulls, rice bran and salt.
B 6130	HORSE FEEDS Caughey-Jossman Co., Detroit, Mich. Royal Horse Chop.....	Grand Rapids.....	{ G.† F.†	.....	16.5 16.6	4.0 6.4	12.5 12.3	.....	Cottonseed meal, brewers' grains, gluten feed, ground screenings, molasses, ground clipped oat by- product, salt.
B 6329	Rosenbaum Bros., Chicago, Ill. Horse Sense Grain Feed.....	Detroit.....	{ G.† F.†	.....	8.5 10.5	4.7 4.3	7.6 5.2	30.00	Corn meal, corn bran, oat hulls.
B 6157		Niles.....	{ G.† F.†	.....	10.0 10.3	3.0 3.9	6.0 6.0	.....	Crushed barley, crushed oats, sift- ed cracked corn.

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
MOLASSES HORSE FEEDS								
B 6338	Grain Belt Milling Co., So. St. Joseph, Mo. Bronco Horse and Mule Feed.	Detroit..... { G.† P.†	..... 15.3	10.0 9.8	1.5 2.4	15.0 10.2	\$40.00	Cracked corn, crushed oats, alfalfa meal, molasses and salt.
B 6388	Hales & Hunter Co., Chicago, Ill. College Horse Feed.	Jackson..... { G.† F.†	..... 12.1	10.0 10.3	2.5 3.3	10.0 3.3	.....	Cracked corn, wheat bran, crushed barley, crushed oats, molasses.
B 6323	Chas. A. Krause Milling Co., Milwaukee, Wis. Badger Pulmor Horse Feed.	Detroit..... { G.† F.†	..... 14.0	9.0 8.7	1.0 2.1	16.0 14.7	38.00	Cracked corn, oats, oat shorts, oat hulls, alfalfa meal, flax plant by-product, molasses and salt.
B 6348	Badger Pulmor Horse Feed.	Detroit..... Average.....	16.0 15.0	7.6 8.2	1.2 1.7	17.0 15.7	2.30	Cracked corn, crushed oats, oat meal mill by-product, alfalfa meal, molasses, flax plant by-product, salt.
B 6321	Krause Horse Feed.	Detroit..... { G.† F.†	..... 14.8	10.0 9.2	2.5 2.3	10.0 9.2	42.00	Cracked corn, crushed oats, alfalfa, molasses and salt.
B 6342	Lichtenberg & Son, Detroit, Mich. Farnel Horse Feed.	Detroit..... { G.† P.†	..... 14.0	10.0 10.6	3.0 5.0	10.0 9.1	40.00	Cracked corn, crushed oats, molasses and salt.
B 6140	The McMillen Co., Fort Wayne, Ind. Wayne Horse Feed.	Decatur..... { G.† P.†	..... 12.8	9.0 11.5	3.0 3.9	16.0 12.3	.....	Cracked corn, crushed oats, alfalfa meal, molasses.

B 6260	Nowak Milling Co., Buffalo, N. Y.	Domino Horse Feed with Alfalfa.....	Holland.....	{ F.}	.....	9.0 10.6	2.0 2.8	14.0 14.4	.....	Cracked corn, crushed oats, alfalfa, molasses, oats and salt.
B 6337	Omaha Alfalfa Mfg. Co., Omaha, Neb.	Peerless Horse & Mule Feed.....	Detroit.....	{ P.}	.....	10.0 10.5	1.5 2.1	18.0 12.3	44.00	Cracked corn, crushed oats, alfalfa meal, molasses.
B 6315	M. C. Peters Milling Co., Omaha, Neb.	King Corn Horse and Mule Feed.....	Detroit.....	{ P.}	.....	10.0 10.8	1.8 2.0	18.0 14.5	43.00	Cracked corn, alfalfa meal, oats and molasses.
B 6314		Rabbit, Horse and Mule Feed.....	Detroit.....	{ P.}	.....	10.0 11.7	1.5 2.4	18.0 15.7	40.00	Cracked corn, oats, alfalfa meal and molasses.
B 6327	Triangle Milling Co., Kansas City, Mo.	Bingo Horse and Mule Feed.....	Detroit.....	{ P.}	.....	9.0 10.2	2.5 2.9	18.0 8.2	.....	Cracked corn, crushed oats, alfalfa, molasses and salt.
B 6326		Triple Grain Horse and Mule Feed.....	Detroit.....	{ P.}	.....	9.0 9.4	2.5 3.0	18.0 9.1	.....	Cracked corn, alfalfa meal, molasses and salt.
POULTRY FEEDS										
B 6372	Amendt Milling Co., Monroe, Mich.	"Amco" Baby Chick Feed.....	Monroe.....	{ P.}	.....	10.0 10.8	2.5 3.3	5.0 2.0	51.00	Finely cracked corn, kafir corn, milo, ground oat groats, millet and grit.
B 6368		"Amco" Poultry Mash.....	Monroe.....	{ P.}	.....	17.0 24.3	2.0 4.8	10.0 5.9	55.00	Linseed meal, gluten feed, corn feed meal, wheat bran and middlings, ground oats, meat scraps, dried buttermilk.
B 6316		"Amco" Scratch Grains, without grit and shells	Detroit.....	{ P.}	.....	10.0 10.4	2.5 3.1	5.0 2.2	45.00	Linseed meal, cracked corn, kafir corn, wheat, rye, barley, buckwheat, oats, screenings, sunflower.
B 6367		"Amco" Scratch Grains, without grit and shells	Monroe.....	.....	12.7	11.1	2.5	2.6	42.00	Same as B 6316, without sunflower; with milo.
			Average.....	.....	12.5	10.8	2.8	2.4		

Abbreviations for Guaranteed and Pound.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
POULTRY FEEDS.—Cont.							
American Milling Co., Peoria, Ill.							
B 6341	Cluck-Cluck Scratch Feed	Detroit..... { G† P†	11.9	10.0 10.4	2.5 2.2	6.0 1.9	\$46.00
B 6099	Tip Top Scratch Feed.....	Jackson..... { G† P†	13.8	10.0 9.9	2.5 2.8	6.0 1.4	.....
Arcady Farms Milling Co., Chicago, Ill.							
B 6395	Arcady Buttermilk Egg Mash.....	Ypsilanti..... { G† P†	10.5	20.0 20.6	4.5 4.3	9.0 8.8	.....
B 5999	Arcady Poultry Feed.....	Adrian..... { G† P†	11.9	10.0 10.4	2.5 3.2	6.0 2.8	3.10
H. W. Baer, Pontiac, Mich.							
B 6081	Baer's Chicken Feed.....	Pontiac..... { G† P†	13.7	9.7 10.6	3.4 2.4	2.8 2.1	3.40
J. J. Badenoch Co., Chicago, Ill.							
B 6195	Sunflower Poultry Feed.....	Petoakey..... { G† P†	13.1	9.5 9.6	2.5 3.2	6.0 2.1	3.00
							Cracked corn, kafir corn, wheat, barley, buckwheat, oats, sunflower.
							Cracked corn, kafir corn, wheat, barley, oats, sunflower.
							Cottonseed meal, linseed meal, gluten feed, corn feed meal, wheat bran and middlings, oat meal, oat shorts, meat scraps, bone meal, alfalfa meal, dried buttermilk, salt.
							Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sunflower.
							Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sunflower.
							Cracked corn, kafir corn, wheat, barley, buckwheat, oats, milo and sunflower.

B 6029	Bay City Grain Co., Bay City, Mich.	Chicken Feed.....	Bay City.....	{ G. P. }	.....	14.6	10.8 10.2	2.6 2.6	2.2 3.2	2.40	Cracked corn, wheat, barley, buck- wheat and oats.
B 6027	Bromfield & Colvin Co., Bay City, Mich.	Egg Producer.....	Bay City.....	{ G. P. }	.....	10.0	16.7 16.7	3.4 3.4	7.5 7.5	3.50	Cottonseed meal, linseed meal, corn, kafir corn, wheat, wheat bran and middlings, rye, barley, oats, beans, alfalfa meal, buck- wheat hulls, CXX feed, salt.
B 6023		Pure Grain Chicken Feed.....	Bay City.....	{ G. P. }	.....	12.8	10.6 10.6	3.1 3.1	3.0 3.0	2.40	Chess, kafir corn, cracked corn, wheat, rye, oats, barley, buck- wheat and sunflower.
B 6020	Cass Bean & Grain Co., Salzburg, Mich.	Chick Feed.....	Salzburg.....	{ G. P. }	.....	12.3	9.5 11.0	2.5 2.7	5.0 3.8	2.50	Corn, cracked corn, wheat, bar- ley, buckwheat, oats, screenings.
B 6332	Caughey-Jossman Co., Detroit, Mich.	CCC Scratch Feed.....	Detroit.....	{ G. P. }	.....	12.7	9.8 10.1	3.6 2.4	3.2 2.5	41.00	Cracked corn, wheat, barley, buckwheat, oats, chess, grit.
B 6330		Common Sense Baby Chick Feed.....	Detroit.....	{ G. P. }	.....	12.5	10.0 10.3	3.5 3.1	5.0 3.3	.....	Finely cracked corn, cracked kafir corn, cracked milo, wheat, millet and wild seeds.
B 6331		Common Sense Developing Feed.....	Detroit.....	{ G. P. }	.....	13.2	9.0 9.8	3.5 2.5	2.5 2.0	46.00	Cracked corn, kafir corn, milo maize, wheat, buckwheat, oats, chess and millet.
B 6324		Common Sense Egg Mash.....	Detroit.....	{ G. P. }	.....	10.0	20.0 16.8	5.0 4.0	5.0 7.5	46.00	Linseed meal, corn meal, kafir corn, screenings, grit, beef scraps, alfalfa meal, oat meal mill by- products, wheat bran and mid- dlings, buckwheat hulls.
B 6334		Common Sense Scratch Feed.....	Detroit.....	{ G. P. }	.....	13.4	10.0 10.4	2.5 2.8	5.0 3.0	44.00	Cracked corn, kafir corn, wheat, buckwheat, barley, oats, sunflower milo maize.

Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS.—Cont.								
Chatfield Milling & Grain Co., Bay City, Mich.								
B 6031	Plymouth Rock Poultry Feed	Bay City..... { G. F.}	12.6	10.0 10.1	2.5 3.1	5.0 2.9	.....	Cracked corn, kafir corn, rye, cracked kafir corn, wheat, bar- ley, buckwheat, oats, steel, ches.
Commercial Milling Co., Detroit, Mich.								
B 6359	Henkel's Poultry Feed	Detroit..... { G. F.}	11.9	9.0 9.8	2.4 2.8	4.0 2.0	.....	Cracked corn, kafir corn, wheat, buckwheat, screenings, sunflower and grit.
B 6360	No. 1 Poultry Feed Special	Detroit..... { G. F.}	12.0	9.0 10.7	2.4 3.5	4.0 3.0	.....	Cracked corn, milo, wheat, rye, buckwheat, oats, screenings and sunflower.
The C. E. DePuy Co., Pontiac, Mich.								
B 6087	Peerless Scratch Feed	Pontiac..... { G. F.}	12.1	10.0 10.5	2.6 3.2	5.0 2.1	\$3.50	Corn, cracked corn, kafir corn, wheat, rye, barley, buckwheat and oats.
The Albert Dickinson Co., Chicago, Ill.								
B 6346	Globe Chick Feed, with grit	Detroit..... { G. F.}	12.2	10.0 10.4	2.6 2.5	5.0 2.2	2.95	Finely cracked corn, cracked kafir corn, cracked wheat, oat groats, millet and grit.
B 6398	Globe Chick Feed, with grit	Ypsilanti..... Average.....	11.7 12.0	10.4 10.4	2.7 2.6	2.2 2.2	.....	Same as B 6346.
B 6345	Globe Developing Feed, with grit	Detroit..... { G. F.}	10.7	10.0 10.1	2.6 2.7	5.0 2.3	2.85	Cracked corn, kafir corn, wheat, buckwheat, oats, grit, millet.

B 6065	Globe Egg Mash.....	{ G. P. }	Mt. Clemens.....	10.5	20.0 19.6	5.0 4.0	10.0 7.2	3.25	Linseed meal, corn feed meal, wheat bran and middlings, meat scraps, alfalfa meal and salt.
B 6298	Globe Egg Mash.....		Muskegon.....	10.7	20.9	5.2	8.1	.....	Same as B 6065, with gluten feed.
B 6318	Globe Egg Mash.....		Detroit.....	10.5	20.8	4.9	8.4	3.50	Same as B 6065
	Average.....		Average.....	10.6	20.4	5.0	7.9		
B 6322	Globe Pigeon Feed, no grit.....	{ G. P. }	Detroit.....	12.3	10.0 14.2	3.5 3.1	5.0 4.1	4.00	Kaffir corn, wheat, buckwheat, peas, millet and hemp.
B 6064	Globe Scratch Feed, no grit.....	{ G. P. }	Mt. Clemens.....	12.3	10.0 11.1	3.5 2.9	5.0 2.6	3.25	Linseed cake, cracked corn, kaffir corn, barley, wheat, buckwheat, oats and sunflower.
B 6075	Globe Scratch Feed, no grit.....		Birmingham.....	12.4	10.4	2.9	2.1	3.50	Same as B 6064, with rye and weed seeds.
B 6297	Globe Scratch Feed, no grit.....		Muskegon.....	13.1	10.6	3.3	2.6	.....	Same as B 6064.
	Average.....		Average.....	12.6	10.7	3.0	2.4		
B 6320	King Pigeon Feed, no grit.....	{ G. P. }	Detroit.....	12.4	10.0 10.9	3.5 3.2	5.0 2.2	3.70	Cracked corn, kaffir corn, wheat, buckwheat, peas, millet and hemp.
B 6349	Rival Scratch Feed, no grit.....	{ G. P. }	Detroit.....	13.7	9.5 10.0	3.5 2.8	5.0 2.0	2.60	Cracked corn, kaffir corn, wheat, barley, oats.
	Average.....		Average.....	12.5	10.0 10.4	3.5 2.8	5.0 2.8	46.00	Cracked corn, kaffir corn, wheat, barley, oats, buckwheat.
B 6523	Pure Gold Scratch Feed.....	{ G. P. }	Plainwell.....	12.5	10.0 10.4	3.5 2.8	5.0 2.8		
	Average.....		Average.....	12.9	10.0 13.9	3.0 3.7	10.0 6.6	55.00	Linseed meal, corn feed meal, wheat bran and middlings, meat scraps, fish scraps, alfalfa meal and grit.
B 6262	Purity Egg Mash.....	{ G. F. }	Grand Rapids.....	10.4 10.5	14.9 15.5	4.4 4.4	5.7 6.4	3.25 3.25	Same as B 6262. Same as B 6262.
B 6293 B 6294	Purity Egg Mash.....		Hudsonville.....	10.4 10.5	14.9 15.5	4.4 4.4	5.7 6.4		
	Average.....		Average.....	11.3	15.4	4.2	6.2	50.00	Cracked corn sifted, kaffir corn, wheat, barley, oats, buckwheat and sunflower.
B 6263	Purity Scratch Feed, no grit.....	{ G. P. }	Grand Rapids.....	15.3	9.0 9.6	3.5 3.6	10.0 1.5		

Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS.—Cont.								
B 6264	Grand Rapids Grain & Mfg. Co.—Cont. Purity Scratch Feed, with grit.....	Grand Rapids..... { G.† F.†	13.3	9.0 9.1	3.6 2.8	10.0 1.8	\$47.50	Same as B 6263, with grit.
			11.2	10.0 10.6	3.0 2.7	6.0 2.7	.....	Cracked corn, kafir corn, milo, wheat, barley, buckwheat, oats, sunflower, salvage wheat.
B 6121	Grain Belt Mills Co., So. St. Joseph, Mo. Gee Bee Hen Feed.....	Allegan..... { G.† F.†	12.4	9.6 9.9	2.6 2.5	6.0 3.4	2.60	Cracked corn, cracked kafir corn, wheat, barley, buckwheat, screen- ings, sunflower and grit.
B 6358	The Guntrup-Perry Co., Detroit, Mich. Cadillac Scratch Feed.....	Detroit..... { G.† F.†	12.7	10.0 10.4	2.6 2.6	6.0 2.8	2.70	Cracked corn, kafir corn, wheat, barley, buckwheat, oats, sun- flower.
B 6357	New Century Scratch Feed, no grit..... Hales & Hunter Co., Chicago, Ill.	Detroit..... { G.† F.†	13.3	10.0 9.6	3.5 3.5	6.0 2.4	2.50	Cracked corn, kafir corn, wheat, barley, buckwheat, oats.
B 6306	Morning Glory Scratch Feed, no grit.....	Detroit..... { G.† F.†	10.4	16.0 17.8	4.6 5.8	9.0 4.9	3.15	Linseed meal, gluten feed, corn feed meal, wheat middlings, oats, meat scraps, alfalfa meal, dried buttermilk, calcium carbonate.
B 6308	Red Comb Egg Mash with dried buttermilk.....	Detroit..... { G.† F.†	11.6	10.0 10.3	2.6 2.6	6.0 2.6	66.00	Cracked corn, kafir corn, wheat, barley, buckwheat, oats, sun- flower.
B 6110	Red Comb Scratch Feed, no grit.....	Grand Rapids..... { G.† F.†	13.0	10.0	3.7	2.1	2.90	Same as B 6110.
B 6307	Red Comb Scratch Feed, no grit.....	Detroit..... Average.....	12.8	10.1	3.1	2.4	.....

B 6189	Hankey Milling Co., Petoskey, Mich.	Vim Scratch Feed.....	Petoskey..... { G.† { F.† 13.4	9.5 9.9	2.5 3.0	5.0 3.0	58.00	Cracked corn, kafir corn, wheat, barley, buckwheat, oats, sun- flower and rye.
B 6233	Holland Co-operative Associa- tion, Holland, Mich.	Co-Operative.....	Holland..... { G.† { F.† 11.3	17.0 17.8	5.5 6.1	7.0 5.6	63.00	Ground corn, wheat bran and mid- dlings, rye, barley, oats, tankage.
B 6350	Chas. A. Krause Milling Co., Milwaukee, Wis.	Badger Cream City Scratch Feed, no grit.....	Detroit..... { G.† { F.† 13.8	9.0 9.4	1.5 2.5	5.0 1.9	2.60	Cracked corn, kafir corn, wheat, barley, buckwheat, oats.
B 6082	Badger Laying Mash.....	Pontiac..... { G.† { F.†	..... 8.4	18.0 18.0	2.8 4.5	10.0 10.5	3.50	Corn feed meal, gr. screenings, corn germ meal, corn flour, wheat bran and middlings, meat scraps, alfalfa meal, dried buttermilk.
B 6347	Badger Laying Mash.....	Detroit..... Average.....	..... 9.5	17.9 17.9	5.2 4.9	7.6 9.1	3.20	Corn germ meal, hominy feed, red dog flour, wheat bran and mid- dlings, meat scraps, fish meal, alfalfa meal, dried buttermilk.
B 6080	Krause Scratch Feed, no grit.....	Pontiac..... { G.† { F.†	..... 13.3	9.0 10.0	1.5 2.4	5.0 2.0	3.40	Cracked corn, kafir corn, milo maize, wheat, barley, buckwheat, oats and sunflower.
B 6270	Ladish Milling Co., Milwaukee, Wis.	Record Maker Chick Feed, no grit.....	Reed City..... { G.† { F.† 12.5	9.5 10.5	2.5 3.4	5.0 1.9	3.00	Cracked corn, cracked kafir corn, cracked wheat and millet.
B 6285	True Value Laying Mash.....	Grand Rapids..... { G.† { F.†	..... 11.0	20.0 20.7	5.0 5.1	10.5 7.5	3.25	Linseed meal, gluten feed, corn feed meal, wheat bran and mid- dlings, ground oats, meat scraps, alfalfa meal and salt.
B 6271	True Value Poultry Mash.....	Reed City..... { G.† { F.†	..... 10.5	16.0 22.3	4.0 4.5	6.0 9.2	3.25	Linseed meal, gluten feed, corn feed meal, wheat bran and mid- dlings, ground oats, meat meal, alfalfa meal.

†Abbreviations for Guaranteed and Found.

MICHIGAN AGRICULTURAL EXPERIMENT STATION

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS.—Cont.								
B 6001	The McMillen Co., Fort Wayne, Ind. Wayne Scratch Feed.....	Hudson..... { G.† { F.†	..... 12.6	10.0 9.6	3.0 3.2	4.8 2.3	\$2.50	Corn, kafir corn, wheat, barley, buckwheat, oats, sunflower.
B 6405	McMorran Milling Co., Port Huron, Mich. Crest Poultry Food.....	Port Huron..... { G.† { F.†	..... 14.7	8.0 10.2	2.0 3.3	6.0 2.2	.....	Cracked corn, kafir corn, wheat, barley, buckwheat, sunflower.
B 6004	Michigan Milling Co., Ann Arbor, Mich. Mimico Scratch Feed.....	Ann Arbor..... { G.† { F.†	..... 12.3	10.0 12.3	2.6 2.7	6.0 2.4	.....	Corn, cracked corn, wheat, rye, barley, buckwheat, oats and screenings.
B 6031	Mt. Clemens Milling Co., Mt. Clemens, Mich. Peerless Poultry Feed.....	Mt. Clemens..... { G.† { F.†	..... 14.7	10.0 10.5	2.6 2.7	6.0 3.0	2.90	Corn, cracked corn, wheat, barley, buckwheat, oats and screenings.
B 6182	Nowak Milling Corporation, Buffalo, N. Y. Domino Laying Mash.....	Hudsonville..... { G.† { F.†	..... 10.7	20.0 21.9	3.0 4.4	10.0 9.8	4.00	Linseed meal, gluten feed, corn feed meal, wheat bran and mid- dlings, oats, meat scraps, bone meal, alfalfa meal and meat flour.

B 6053	Park & Pollard Co. of Ill., Chicago, Ill.	"Lay or Bust" Dry Mash	Flint	{ G.† P.†	9.1	18.0 19.6	1.5 4.1	12.0 8.6	3.50	Corn feed meal, ground wheat bran, wheat middlings, ground barley, meat scraps, fish bone meal, alfalfa meal, salt, calcium phos- phate, limestone.
B 6049	Peninsular Milling Co., Flint, Mich.	Peninsular Scratch Feed	Flint	{ G.† P.†	12.2	10.0 11.1	2.5 2.7	5.0 2.8	3.00	Corn cockle, chass, cracked corn, kafir corn, wheat, barley, oats and buckwheat.
B 6048	Postum Cereal Co., Battle Creek, Mich.	Peninsular Scratch Feed, with shells	Flint	{ G.† P.†	12.3	10.0 10.7	2.5 2.2	5.0 2.5	2.90	Same as B 6049, with shells and sunflower.
B 6516	Prairie State Milling Co., Chicago, Ill.	Chicken Feed	Battle Creek	{ G.† P.†	10.9	8.0 12.2	1.0 3.0	10.0 4.0	24.00	Corn, oats and wheat screenings.
B 6252	Early Egg Scratch Feed, with grit	Muskegon		{ G.† P.†	11.5	9.0 10.4	3.7 3.7	3.5 3.1	46.00	Cracked corn, kafir corn, wheat, barley, buckwheat, oats, weed seeds and grit.
B 6196	Red Crown Scratch Feed, no grit	Petoskey		{ G.† P.†	12.7	9.0 10.4	2.5 2.8	2.5 2.8	3.00	Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sun- flower.
B 6251	Red Crown Scratch Feed, no grit	Muskegon	Average		11.9 12.3	10.7 10.6	3.1 3.0	2.5 2.7	50.00	Same as B 6196
B 6392	The Quaker Oats Co., Chicago, Ill.	Big Egg Scratch Grains, no grit	Jackson	{ G.† P.†	12.5	10.0 9.6	2.5 2.5	5.0 2.0		Cracked corn, kafir corn, milo, wheat, barley, sunflower.
B 6041	Ful-O-Pep Dry Mash		Port Huron	{ G.† P.†	9.0	20.0 21.7	4.0 4.8	10.0 9.4	4.00	Cottonseed meal, corn gluten feed, hominy feed and meal, wheat bran, oatmeal, screenings, meat scraps, fish bone meal, alfalfa meal.

†Abb. reviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS—Cont.								
The Quaker Oats Co.—Cont.								
B 6069	Ful-O-Pep Dry Mash.....	Mason.....	9.5	22.2	5.3	6.3	\$4.00	Same as B 6041, without hominy screenings.
B 6216	Ful-O-Pep Dry Mash.....	Zeeland.....	9.2	21.9	5.2	9.2	4.50	Same as B 6041, without hominy meal; with yellow hominy feed.
		Average.....	9.2	21.9	5.1	8.3		
B 6340	Ful-O-Pep Scratch Grains.....	Detroit.....	13.1	10.0 10.3	2.6 2.4	6.0 1.6	48.00	Cracked corn, kafir corn, milo, wheat, barley, sunflower, buckwheat.
B 6339	Schumacher Scratch Grains, no grit.....	Detroit.....	12.9	10.0 10.7	2.6 2.2	6.0 2.1	45.00	Same as B 6340.
Ralston Purina Co., St. Louis, Mo.								
B 6037	Purina Chicken Chowder, with charcoal.....	Port Huron.....	9.9	19.0 20.2	4.0 4.3	10.0 10.2	4.00	Gluten feed, corn meal, wheat bran and middlings, meat scraps, alfalfa meal, charcoal and salt.
B 6036	Purina Hen Chow Scratch Feed.....	Port Huron.....	13.1	10.0 10.6	2.6 3.0	4.0 2.4	3.00	Cracked corn, kafir corn, barley, buckwheat, milo, wheat, sunflower.
Rosenbaum Bros., Chicago, Ill.								
B 6087	"77" Scratch Feed, with grit.....	Mason.....	11.5	9.0 9.5	2.0 2.6	7.0 1.5	3.50	Cracked corn, kafir corn, barley, buckwheat, wheat, oats and grit.
B 6282	Vitality Egg Mash with Milk Albumen.....	Muskegon Heights..	8.5	18.0 18.8	4.0 4.1	10.0 8.0	3.00	Linseed meal, corn feed meal, wheat bran and middlings, barley, milk albumen, oats, meat scraps, bone meal, $\frac{1}{2}$ alfalfa meal, calcium carbonate.

B 6406	Vitality Egg Mash with Milk Albumen.....	Port Huron.....	9.8	19.8	4.6	7.5	.....	Same as B 6282.
		Average.....	9.2	19.3	4.4	7.8		
B 6305	Vitality Scratch Feed, no grit.....	Detroit.....	{G:† P:†}	{10.0 9.9}	{2.6 3.5}	{5.0 2.1}	3.25	Cracked corn, kafir corn, barley, buckwheat, wheat, sunflower, oats.
B 5912	Saginaw Milling Co., Saginaw, Mich. Red Hen Mash.....	Saginaw.....	{G:† P:†}	{16.5 19.1}	{2.5 5.0}	{10.0 6.4}	66.00	Corn meal, wheat bran and mid- dlings, meat scraps and alfalfa meal.
B 5915	Red Hen Scratch Feed.....	Saginaw.....	{G:† P:†}	{9.6 10.9}	{2.7 3.8}	{3.0 3.9}	62.00	Cracked corn, kafir corn, barley, wheat, sunflower, oats.
B 5916	Wolverine Scratch Feed.....	Saginaw.....	{G:† P:†}	{9.4 10.4}	{2.5 2.7}	{2.0 2.5}	60.00	Cracked corn, kafir corn, barley, wheat, sunflower, oats and screen- ings.
	Scheuren-Mok Mill Co., Detroit, Mich.							
B 6310	Co-operative Scratch No. 2 Feed, with grit..	Detroit.....	{G:† P:†}	{10.0 9.4}	{2.5 4.1}	{5.0 2.5}	3.10	Cracked corn, milo, barley, buck- wheat, oats, broom corn and grit.
B 6313	Eagle Mash.....	Detroit.....	{G:† P:†}	{18.0 17.8}	{4.0 5.0}	{8.0 6.3}	3.75	Corn meal, corn bran, gr. corn, gr. kafir corn, wheat bran and middings, charcoal, beef scraps, alfalfa meal, buckwheat hulls.
B 6312	Eagle Pigeon Feed.....	Detroit.....	{G:† P:†}	{11.0 12.8}	{2.5 2.8}	{4.0 3.2}	4.25	Wheat, buckwheat, peas, milo and millet.
B 6309	Eagle Scratch Feed, no grit.....	Detroit.....	{G:† P:†}	{10.0 9.8}	{2.5 3.8}	{5.0 1.8}	3.25	Cracked corn, milo, wheat, barley, buckwheat, oats, screenings and sunflower.
B 6386	Scholl & Rath, Monroe, Mich. Waterloo Scratch Feed.....	Monroe.....	{G:† P:†}	{12.3 12.3}	{2.6 2.6}	{3.7 3.7}	.....	Cracked corn, wheat, barley, buck- wheat, screenings.
B 6501	Standard Grocer & Mfg. Co., Holland, Mich. Standard Scratch Feed.....	Holland.....	{G:† P:†}	{9.4 9.5}	{2.5 3.0}	{4.0 2.1}	.....	Cracked corn, kafir corn, wheat, barley, oats, chess and grit.

Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS.—Cont.								
B 6391	Stockbridge Elevator Co., Jackson, Mich. Seco Little Chick Feed.....	Jackson..... { G.† F.† }	12.0	10.0 10.7	3.5 4.0	5.0 2.5		Cracked corn, cracked milo, cracked wheat, cracked barley, cracked oat groats and millet.
B 6389	Seco Egg Mash.....	Jackson..... { G.† F.† }	11.1	19.0 20.8	3.5 4.3	6.0 5.6		Linseed meal, gluten feed, gr. corn, wheat brans and middlings, gr. oats, meat scraps, bone meal, alfalfa meal.
B 6376	Seco Scratch Feed.....	Jackson..... { G.† F.† }	11.6	10.0 10.3	2.5 3.0	5.0 2.6		Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sun- flower.
B 6356	David Stott Flour Mills, Detroit, Mich. "Columbus" Scratch Feed.....	Detroit..... { G.† F.† }	13.4	10.0 10.7	3.0 2.7	5.0 2.4		Cracked corn, milo maize, wheat, barley, buckwheat, oats and sun- flower.
B 6381	Toledo Grain & Mlg. Co., Toledo, O. Camp's Red Ball Scratch Feed.....	Morenci..... { G.† F.† }	12.3	10.0 11.7	2.5 3.0	5.0 2.9		Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sun- flower.
B 6304	Tomlinson Watson Co., Detroit, Mich. Red Bird Scratch Feed.....	Detroit..... { G.† F.† }	13.4	10.0 10.6	2.5 3.2	5.0 2.2	\$3.50	Linseed meal, cracked corn, kafir corn, wheat, barley, buckwheat, oats and sunflower.

FEEDING STUFFS

Watson-Higgins Milling Co., Grand Rapids, Mich.									
B 6205	Perfection Scratch Feed.	Greenville	{ G. P.	12.7	9.0 10.7	2.0 3.0	8.0 2.6	3.25	Cracked corn, kafir corn, wheat, barley, buckwheat, oats.
B 6280	Perfection Scratch Feed.	Grand Haven.		14.8	10.1	2.7	1.8	2.65	Same as B 6205, with rye and ergot, sunflower.
	Average			13.8	10.4	2.9	2.2		
B 6022	Chicken Feed.	Bay City	{ G. P.	14.1	10.8 10.8	2.5 2.5	3.5 3.5	2.90	Cracked corn, wheat, barley, buckwheat and sunflower.
Wenonah Flouring Mills, Bay City, Mich.									
Western Feed Mfrs., Inc., Chicago, Ill.									
B 6156	Commercial Scratch Feed, no grit.	Niles	{ G. P.	11.4	10.0 9.6	3.0 3.0	5.0 2.5		Cracked corn.
B 6289	Commercial Scratch Feed, no grit.	Niles		11.1	9.8	3.4	2.3	2.50	Same as B 6156, with weed seeds and sunflower.
	Average			11.3	9.7	3.2	2.4		
B 5920	Commercial Scratch Feed, with grit.	Lansing	{ G. P.	11.7	10.0 9.8	3.0 3.8	5.0 2.0	3.90	Cracked corn, milo, wheat, bar- ley, buckwheat, oats and grit.
B 6055	Commercial Scratch Feed, with grit.	Plint.		11.5	9.1	2.9	1.7	2.90	Same as B 5920.
	Average			11.6	9.4	3.3	1.9		
B 6056	"Rep" Scratch Feed, no grit.	Plint.	{ G. P.	11.9	10.0 9.2	3.0 2.7	5.0 2.3	3.00	Cracked corn, milo, wheat, bar- ley, buckwheat, oats.
B 5923	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Lansing	{ G. P.	10.0	18.0 14.9	4.0 4.5	8.0 7.8	4.60	Linsed meal, corn feed meal, wheat bran and middlings, oats, meat scraps, alfalfa meal, skim milk, dried buttermilk and salt.
B 6058	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Plint.		9.5	19.9	5.7	6.9	3.50	Linsed meal, gluten feed, corn feed meal, wheat bran and midds., gr. oats, meat scraps, alfalfa meal dried skim milk salt, dried butter- milk, calcium carbonate.
B 6071	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Lansing		9.1	18.0	4.2	6.8	3.75	Same as B 6058.
B 6159	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Niles		9.6	18.9	5.0	7.9		Same as B 6058, without gluten feed.

†Abbreviations for Guaranteed and Found.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
POULTRY FEEDS—Cont.								
Western Feed Mfrs., Inc.—Cont.								
B 6178	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Grand Rapids.	10.6	17.4	5.3	7.7	\$3.50	Same as B 6058.
B 6287	Sincerity Egg Mash with Skim Milk and Dried Buttermilk.	Niles.	10.6	18.6	5.1	7.9	4.00	Same as B 6058.
	Average.		9.9	17.5	5.0	7.5		
B 5922	Sincerity Scratch Feed, no grit.	Lansing.	11.8	10.0	5.0	5.0	4.10	Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sunflower.
B 6057	Sincerity Scratch Feed, no grit.	Flint.	12.1	10.4	2.9	2.5	3.00	Same as B 5922, with milo.
B 6177	Sincerity Scratch Feed, no grit.	Grand Rapids.	12.7	10.0	3.2	3.1	3.25	Same as B 5922.
	Average.		12.2	10.1	3.2	2.8		
B 6072	Sure Pay Scratch Feed, no grit.	Niles.	13.6	10.0	5.0	5.0	3.25	buckwheat, oats and sunflower.
B 6155	Sure Pay Scratch Feed, no grit.	Niles.	12.1	9.6	3.1	1.9		Same as B 6072.
B 6288	Sure Pay Scratch Feed, no grit.	Average.	12.4	9.6	3.2	2.2		Same as B 6072, with grit.
B 5921	Sure Pay Scratch Feed, with grit.	Lansing.	12.3	9.8	5.0	5.0	3.90	Cracked corn, milo, wheat, barley, buckwheat, oats, grit.
B 6054	Sure Pay Scratch Feed, with grit.	Flint.	12.1	10.1	2.7	2.3	2.80	Same as B 5921, with sunflower.
	Average.		12.2	10.0	3.1	2.3		
C. C. Wright, Son & Co., Owosso, Mich.								
B 6047	Wright's Mixture.	Owosso.	12.9	9.5	5.0	5.0	2.90	Cracked corn, kafir corn, wheat, barley, buckwheat, oats and sunflower.

B 6508	A. K. Zinn & Co., Battle Creek, Mich. Peerless Scratch Feed.....	Battle Creek.....	{ G.† { F.†	10.0 11.3	2.5 3.3	5.0 2.8	2.50	Corn, cracked corn, kafir corn, milo, wheat, rye, barley, buck- wheat, oats and sunflower.
WHEAT BRAN								
B 6142	Arkansas City Mfg. Co., Arkansas City, Kas.	Wheat Bran & Screenings.....	{ G.† { F.†	14.5 17.6 10.0 15.0 12.5 17.8 17.1	3.5 3.3 4.0 2.2 3.7	10.0 9.3 10.0		
B 6148		Wheat Bran & Screenings.....		10.5	3.3			
B 6256		Wheat Bran & Screenings.....		12.5	4.0			
B 6410		Wheat Bran & Screenings.....		13.0	2.2			
Big Diamond Mills Co., Mississippians, Minn.								
B 6286	Big Diamond Wheat Bran, with gr. screenings not exceeding mill run.....	Cadillac.....	{ G.† { P.†	13.0 13.9	3.5 5.0	13.9 11.8	40.00	
J. P. Burroughs & Son, Flint, Mich.								
B 6051	Choice Winter Wheat Bran, with ground screenings not exceeding mill run.....	Flint.....	{ G.† { P.†	12.5 14.8	3.0 3.5	10.5 9.4	1.90	
W. A. Coombs Milling Co., Coldwater, Mich.								
B 6211	Rob Roy Feed Winter Wheat Bran, with ground screenings not exceeding mill run...	Coldwater.....	{ G.† { P.†	14.0 15.2	3.0 3.8	10.0 9.5	48.00	
B 6373	Rob Roy Feed Winter Wheat Bran, with ground screenings not exceeding mill run...	Coldwater.....		10.0	3.5	9.3		
	Average.....			10.0	3.7	9.4		
B 6522	Wheat Bran, mixed with screenings not over mill run.....	Plainwell.....	{ G.† { P.†	16.2 13.5	3.3 3.2	11.8 10.6	30.00	

†Abbreviations for Guaranteed and Pounds.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
WHEAT BRAN.—Cont.							
B 6387	Everett Aughenbaugh & Co., Waseca, Minn. E-A-Co Wheat Bran	Jackson { G. F.	10.6	14.0 15.6	3.0 4.7	12.0 9.8	
B 6186	The Goerz Flour Mills Co., Newton, Kas. Wheat Bran & Screenings	Nunica { G. F.	13.5	14.5 17.8	3.5 4.0	11.0 8.1	\$40.00
B 6104	Goshen Milling Co., Goshen, Ind. Wheat Bran and Ground Wheat	Chaire { G. F.	9.7	14.5 16.9	3.5 3.8	11.0 8.9	
B 6191	Hanky Milling Co., Petoskey, Mich. Bran, with mill run screenings	Petoskey { G. F.	12.5	13.5 14.5	3.7 4.2	9.5 8.9	40.00
B 6336	Ismert-Hincke Milling Co., Kansas City, Mo. I-H Bran	Detroit { G. F.	11.1	14.5 16.7	3.5 4.0	10.0 8.7	33.00
B 6385	The Larabee Flour Mills Corp., Kansas City, Mo. Wheat Bran	Jackson { G. F.	11.0	15.0 17.1	3.5 3.9	10.5 8.5	

MICHIGAN AGRICULTURAL EXPERIMENT STATION

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
	WHEAT MIDDINGS—Cont.						
B 6212	Bay State Milling Co., Winona, Minn.	Kalamazoo..... { G.† P.†	11.1	15.9 16.8	4.0 4.9	7.5 6.6	\$54.00
	Big Diamond Mills Co., Minneapolis, Minn.						
B 6265	"Big Diamond Wheat Flour Middings" with ground screenings not exceeding mill run...	Cadillac..... { G.† P.†	11.7	16.0 16.6	4.5 5.5	8.9 8.1	50.00
	J. P. Burroughs & Son, Flint, Mich.						
B 6050	Fancy Winter Middings, with ground screen- ings not exceeding mill run...	Flint..... { G.† P.†	10.8	11.0 16.3	3.0 4.4	4.0 6.6	2.30
	Commercial Milling Co., Detroit, Mich.						
B 6038 B 6363	Standard Wheat Middings Standard Wheat Middings	Port Huron..... Detroit..... { G.† P.†	11.5 10.8	15.6 16.3 17.1	4.6 4.4 4.6	10.0 7.5 7.7	45.00
	W. A. Coombs Milling Co., Coldwater, Mich.	Average.....	11.2	16.7	4.5	7.6	
B 6374	Rob Roy Feed Winter Wheat Middings, with ground screenings not exceeding mill run...	Coldwater..... { G.† P.†	10.7	16.0 17.0	3.0 4.0	8.0 7.6	

B 5907	Franke LaBudde Grain Co., Milwaukee, Wis. Standard Middlings, with ground screenings not exceeding mill run.....	Howell.....	{ G. P. }	..... 9.5	14.6 15.0	3.6 5.0	9.0 9.8	58.00
B 6185	The Goerz Flour Mills Co., Newton, Kas. Gray Wheat Shorts & Screenings.....	Nunica.....	{ G. P. }	..... 13.0	16.0 17.0	3.6 4.0	6.6 5.2	50.00
B 6402	Huron Milling Co., Harbor Beach, Mich. Jenks White Middlings.....	Harbor Beach.....	{ G. P. }	..... 11.0	14.0 14.5	3.0 4.2	8.0 3.5	.....
B 6283	The Ismert-Hincke Milling Co., Kansas City, Mo. L-H Pure Fancy Wheat Middlings Feed.....	Muskegon Heights..	{ G. P. }	..... 7.9	16.6 15.6	3.6 2.0	8.6 1.4	.....
B 6394	Lindsborg Mfg. & Elev. Co., Lindsborg, Kas. Wheat Shorts.....	Ypsilanti.....	{ G. P. }	..... 11.9	16.0 19.2	3.6 4.8	6.6 5.2	.....
B 6024	National Feed Co., St. Louis, Mo. Wheat Middlings, with ground screenings not exceeding mill run.....	Bay City.....	{ G. P. }	..... 11.5	16.0 16.9	4.0 4.6	9.0 6.5	2.50
B 6044	The Southwestern Mfg. Co., Kansas City, Mo. "Red Turkey" Wheat Grey Shorts & Wheat Scourings.....	Parma.....	{ G. P. }	..... 11.6	16.0 17.4	3.8 3.8	8.0 7.0	.....

Abbreviations for Guaranteed and Pounds.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.
WHEAT MIDDINGS.—Cont.							
Star & Crescent Milling Co., Chicago, Ill.							
B 6133	Star Standard Middlings.....	Grand Rapids..... { G.† F.†	..... 10.5	16.0 16.3	4.0 5.0	8.0 6.7	\$40.00
David Stott Flour Mills, Detroit, Mich.							
B 6353	Pennant Middlings.....	Detroit..... { G.† F.†	..... 11.8	16.0 17.5	4.0 5.0	9.0 6.2	.....
WHEAT MIXED FEEDS							
The J. E. Bartlett Co., Jackson, Mich.							
B 6138	Fine Ground Wheat Feed.....	Jackson..... { G.† F.†	..... 12.2	15.7 15.1	4.6 4.3	8.3 3.5	.....
Huron Milling Co., Port Huron, Mich.							
B 6401	Jenks Mixed Feed.....	Harbor Beach..... { G.† F.†	..... 11.6	14.0 13.6	3.6 3.5	11.5 7.2	.....
David Stott Flour Mills, Detroit, Mich.							
B 6354	Honest Mixed Feed.....	Detroit..... { G.† F.†	..... 11.5	14.6 16.7	4.0 5.0	10.6 7.7	.....

WHEAT AND RYE MIXED
FEEDCommercial Milling Co.,
Detroit, Mich.B 6364 Henkel's Fine White Feed.
B 6039 Henkel's Fine White Feed.

Detroit.....	{ G.†	15.0	4.0	9.0
Port Huron.....	{ F.†	11.6	3.3	4.8
		10.7	3.8	6.4
Average.....		11.2	3.1	5.6

50.00

The Quaker Oats Co.,
Chicago, Ill.

B 6089 Buckeye Feed.....

Ann Arbor.....	{ G.†	15.5	4.5	11.0
	{ F.†	10.9	5.0	8.2

RYE FEED

W. A. Coombs Milling Co.,
Coldwater, Mich.

B 6210 Rob Roy Rye Feed.....

Kalamazoo.....	{ G.†	15.0	2.9	6.0
	{ F.†	11.6	3.1	4.7

2.80

MISCELLANEOUS FEEDS

Armour Grain Co.,
Battle Creek, Mich.

B 6503 Macaroni Feed.....

Battle Creek.....	{ G.†	12.0	0.2	1.5
	{ F.†	9.7	0.4	0.4

25.00

B 6300 Pancake Flour Feed.....

Battle Creek.....	{ G.†	8.5	0.4	1.5
	{ F.†	10.8	0.8	0.4

25.00

Chas. F. Bartlett Co.,
Grand Rapids, Mich.

B 6225 Economy Rice Bran.....

Grand Rapids.....	{ G.†	12.0	12.0	12.0
	{ F.†	10.0	13.8	10.9

Rice bran.

37.50

Tabletiations for Guaranteed and Found.

Wheat, corn and oat flour, sugar,
acid, calcium phosphate, sodium
bicarbonate, powdered skim milk
and salt.

ANALYSES OF FEEDING STUFFS FOR 1920-1921.—Continued

Laboratory Number	Manufacturer and Trade Name	Sampled at	Moisture	Crude Protein	Crude Fat	Crude Fiber	Price per Ton or Cwt.	
MISCELLANEOUS FEEDS.— Cont.								
B 6221	Louisiana State Rice Mfg. Co., Inc., New Orleans, La.							
	Lastarmco Rice Bran.....	{ G.† P.†	9.9	12.0 12.3	12.0 12.5	12.0 10.2	\$2.00	Rice bran.
B 6361	Commercial Milling Co., Detroit, Mich.							
	Honkel's Chop Feed.....	{ G.† P.†	10.8	9.5 9.2	3.5 4.3	9.0 5.2	.....	Corn feed meal, wheat middlings, gr. oats and oat hulls.
	Buckwheat Feed.....	{ G.† P.†	10.6	10.5 11.1	2.6 2.6	28.0 33.6	.....	Buckwheat middlings and ground buckwheat hulls.
B 6073	Cragin Products Co., Chicago, Ill.							
	Cragin Products Co. Kiln Dried Corn Dis- tillers' Grains.....	{ G.† P.†	6.8	28.0 31.1	2.0 11.1	14.5 12.9	55.00	Distillers' grains.
B 5908	Franke LaBudde Grain Co., Milwaukee, Wis.							
	Barley Feed.....	{ G.† P.†	9.0	12.0 13.4	5.6 3.9	12.0 13.4	58.00	Barley feed and ground screen- ings.
B 6510	Kellogg Toasted Corn Flake Co., Battle Creek, Mich.							
	Broken Wheat Biscuit.....	{ G.† P.†	6.2	12.6 12.9	0.8 1.6	2.9 4.0	42.00	Broken wheat biscuit feed.

B 6512	Cooked Bran Feed.....	Battle Creek.....	{ G. F.}	8.9	15.5 15.6	2.5 3.8	10.0 8.4	Cooked wheat bran.
B 6509	Dried Corn Flake Feed.....	Battle Creek.....	{ G. F.}	4.9	6.9 8.8	2.2 1.5	0.4 1.4	Corn flake feed.
B 6513	Malt Feed.....	Battle Creek.....	{ G. F.}	4.5	28.0 28.3	5.2 5.6	12.5 11.5	Malt feed.
Michigan Cereal Co., Port Huron, Mich.								
B 6040	Pea Bran.....	Port Huron.....	{ G. F.}	8.6	15.0 19.8	0.5 1.5	50.0 24.7	Pea bran.
Michigan Sugar Co., Detroit, Mich.								
B 6052	Dried Beet Pulp.....	Flint.....	{ G. F.}	8.3	8.0 8.9	0.5 0.8	20.0 18.2	Dried beet pulp.
The Peoples Milling Co., Muskegon, Mich.								
B 6250	Corn Feed Meal & Ground Oats.....	Muskegon.....	{ G. F.}	13.9	9.0 8.9	3.7 2.6	7.0 4.7	Corn feed meal and ground oats.
Postum Cereal Co., Battle Creek, Mich.								
B 6514	Barley Bran.....	Battle Creek.....	{ G. F.}	7.3	8.0 7.7	1.8 2.1	22.0 20.4	Barley hulls.
B 6519	Burt's Cereal Feed.....	Battle Creek.....	{ G. F.}	6.2	17.0 18.6	3.0 3.1	20.0 18.5	Postum by-product.
B 6517	Cooked Corn Grits.....	Battle Creek.....	{ G. F.}	12.2	6.0 7.8	0.2 0.6	2.0 0.4	Cooked corn grits.
B 6518	Flaked Corn Feed.....	Battle Creek.....	{ G. F.}	6.9	8.0 8.6	1.0 1.6	2.0 1.0	Corn flake feed.
B 6515	G-N Feed.....	Battle Creek.....	{ G. F.}	6.9	9.0 12.6	0.5 1.1	2.5 1.2	Grape nut feed.
Saginaw Milling Co., Saginaw, Mich.								
B 5911	C & O Chop.....	Saginaw.....	{ G. F.}	11.5	8.9 11.9	3.5 4.1	5.5 4.0	Ground corn, ground light oats and ground screenings.

Abbreviations for Guaranteed and Found.

The Bulletins of this Station are sent free to all newspapers in the State and to such individuals interested in farming as may request them. Address all applications to the Director, East Lansing, Michigan.

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 Railroad and Express address Lansing, Mich.
 A Department of the State Agricultural College, and, with it, Controlled by the

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Schell, H. A.	Clerk
Beebe, B.	Stenographer
Rozema, J.	Stenographer
Helmic, Julia.	Stenographer
Frost, Bessie.	Stenographer
Meehan, Gertrude.	Stenographer

SUB-STATIONS

Chatham, Alger County, 760 acres deeded. D. L. McMillan, Supt.
 South Haven, Van Buren County, 10 acres rented; 5 acres deeded.
 Graham Station, Kent County, 50 acres donated.

